TRISTAN OLIVER
ISLE OF DOGS

JO WILLEMS, ASC, SBC
RED SPARROW

LULA CARVALHO, ASC, ABC
7 DAYS IN ENTEBBE

American Cinematographer

An International Publication of the ASC

APRIL 2018

A WRINKLE IN TIME

TOBIAS SCHLIESSLER, ASC AND DIRECTOR AVA DUVERNAY VENTURE THROUGH THE GALAXY

PLUS:
BEHIND THE SCENES
OF GENERAL HOSPITAL

AMERICAN CINEMATOGRAPHER • APRIL 2018 • A WRINKLE IN TIME – ISLE OF DOGS – GENERAL HOSPITAL – RED SPARROW – 7 DAYS IN ENTEBBE • VOL. 99 NO. 4


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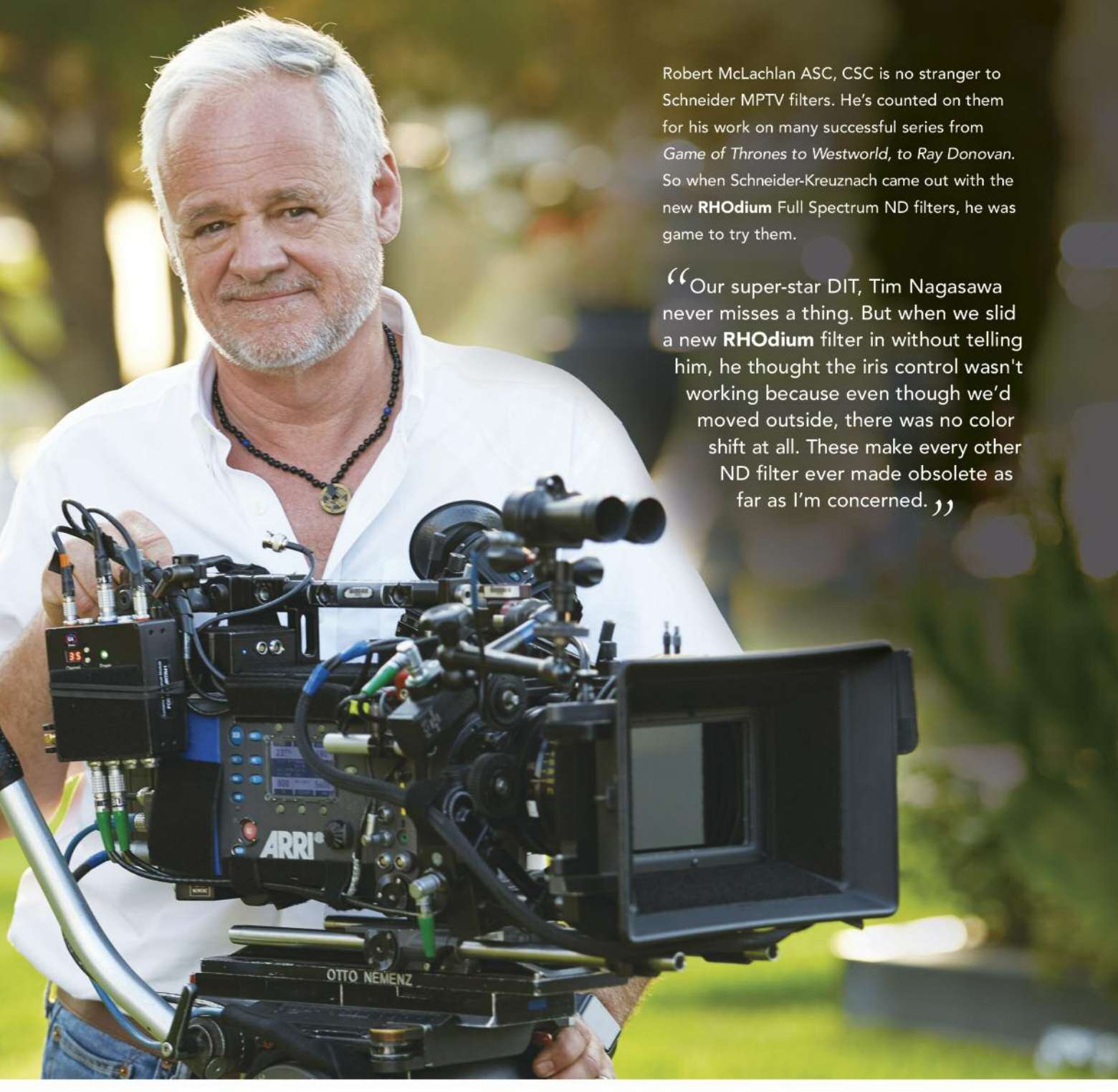

Robert McLachlan ASC, CSC is no stranger to Schneider MPTV filters. He's counted on them for his work on many successful series from *Game of Thrones to Westworld, to Ray Donovan.* So when Schneider-Kreuznach came out with the new **RHOdium** Full Spectrum ND filters, he was game to try them.

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American Cinematographer
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On Our Cover, from left: Mrs. Whatsit (Reese Witherspoon), Mrs. Which (Oprah Winfrey) and Mrs. Who (Mindy Kaling) aid a young girl's interstellar search for her missing father in the feature *A Wrinkle in Time*, shot by Tobias Schliessler, ASC. (Image courtesy of Disney Enterprises Inc.)

FEATURES

50

68

84

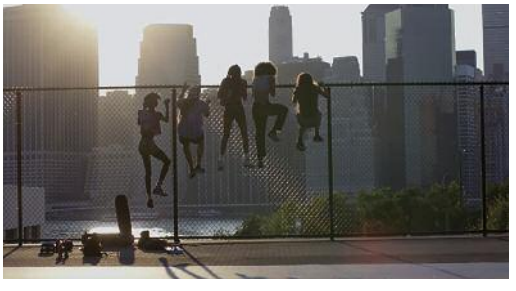
100

DEPARTMENTS

The annual Park City cinema summit always presents a schedule of unique narrative and documentary projects. *American Cinematographer* was on the scene and offers two online reports that dig deep into the current state of indie production and post.

You'll find both at ascmag.com/articles

sundance film festival '18



Cinematography Standouts

***AC* offers a guide to 10 Sundance titles that impressed audiences with their exceptional visual approach to storytelling, including *I Think We're Alone Now*, *Skate Kitchen*, *Monsters and Men*, *We the Animals*, *Time Share*, *Loveling* and *American Animals*.**

Log on at bit.ly/ACSundance2018 for more from the festival, and at bit.ly/CanonACSundance for full video of each Canon Creative Studio panel discussion.

At the Canon Creative Studio

In partnership with Canon, *AC* moderated a series of six in-depth panel discussions at the company's headquarters on Main St. in Park City, focusing on a variety of creative and technical topics in regard to specific projects and key issues:

DP First: Women Who Shoot

Three cinematographers — Autumn Eakin, Claudia Raschke and Greta Zozula — examine and what it means to be a woman in the industry today.

Shooting Cinematic VR — *Awavena*

Lead artist Lynette Wallworth and director of photography Greg Downing discuss virtual reality's future through the lens of their trippy VR project *Awavena*.

Documentary Cinematography

When shooting documentaries, you need the right tools to pick up and go. Cinematographers Laela Kilbourn, Max Preiss and Graham Willoughby chat about the gear they use to capture cinematic cinema verité.

Spotlight on Collaboration: *The Sentence*

Mastering the art of collaboration is the key to filmmaking. Hear from director-cinematographer Rudy Valdez and editor Viridiana Lieberman as they break down their process.

Options in Optics

Lenses are the ultimate creative tool. But how do you decide which glass to use to craft your desired look? Three cinematographers — Brent Barbano, Martina Radwan and Yamit Shimonovitz — share their insights.

Spotlight on Indie Episodic: *The Adulterers*

Director-cinematographer Darin Quan and cinematographer Zack Schamberg take us behind the scenes of *The Adulterers*, shot with Canon's EOS C300 Mark II.

VICTOR HAMMER ON CINEMATOGRAPHY

My advice to those starting out is learn the technical side first! Know the cameras inside and out. On set you can't think about the technical stuff at all—its got to be intuitive. Once you learn the tools then you can be artistic about it. Its OK to start at the bottom and if you work hard with your eye on the prize, and you really want it, you'll get it. To this day, I am still happy that people hire me, it's just wonderful.

Victor Hammer loves, loves, loves cinematography. With a solid resume of hit features and television series, he's never jaded and never short on the infectious enthusiasm he brings to the set. And he is thrilled to be in his ninth season shooting the amazingly successful *NCIS: Los Angeles*. Giving true meaning to the word action, Hammer propels each day on set with his personal brand of never ceasing energy.

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American Cinematographer

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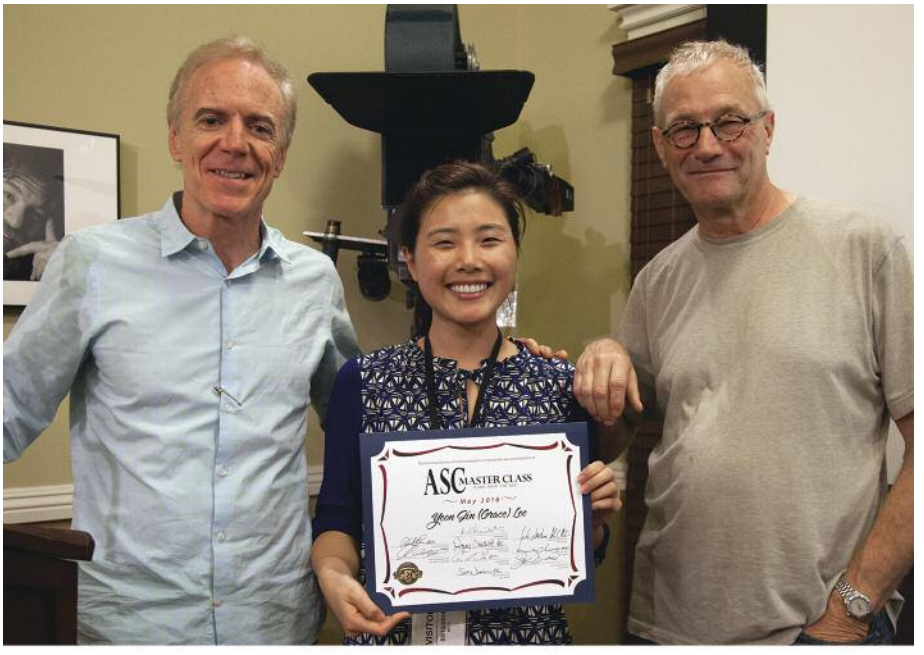

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THIS MONTH'S CONTRIBUTORS

Rachael K. Bosley
is a freelance writer and a former staff editor ("Animal Kingdom," p. 50).

Kelly Brinker
is the photo editor ("The Never-Ending Story," p. 68).

Michael Goldman
is a Los Angeles correspondent for the magazine ("Across the Universe," p. 32).

Jay Holben
is a filmmaker and an associate member of the ASC (Shot Craft, p. 16).

Sherri Kauk
is a cinematographer (Filmmakers' Forum, p. 116).

Michael Kogge
is a freelance writer ("Daring Operation," p. 100).

Matt Mulcahey
is a filmmaker and freelance writer ("Seduce and Destroy," p. 84).

Phil Rhodes
is a filmmaker and freelance writer (Short Takes, p. 26).

EDITOR'S **NOTE**

This is an issue my mother will love.

When I was a young reader in Massachusetts who accompanied my mom on her frequent trips to the Salem Public Library — an institution she's supported so faithfully that the administration should name a wing, or at least a reading room, after her — she introduced me to Madeleine L'Engle's fantasy novel *A Wrinkle in Time*. Now ASC member Tobias Schliessler has helped mount an ambitious Disney adaptation starring Storm Reid as young heroine Meg Murry, with star-power support from Oprah Winfrey, Reese Witherspoon and Mindy Kaling as celestial guides Mrs. Which, Whatsit and Who, respectively.

Director Ava DuVernay's previous career directly influenced her decision to collaborate with Schliessler on the saga's epic journey through space and time. "I was a publicist for *Dreamgirls* [which Schliessler shot for director Bill Condon]," she tells Michael Goldman ("Across the Universe," page 32). "I watched Tobias on that set, and I thought, 'He's cool, he's calm, he's collected, he's focused.' And when I saw the film, I thought it was gorgeous."

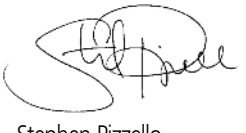
My mom will be equally delighted to read photo editor Kelly Brinker's comprehensive piece on the production of *General Hospital*, the longest-running soap opera still on the air, which has kept both of them tuning in faithfully for decades. As Kelly notes in her article ("The Never-Ending Story," page 68), *General Hospital* has been airing on ABC since April 1, 1963, and recently broadcast its 14,000th episode in February. I hereby confess that even I got sucked into portions of the show's rollercoaster drama during the Luke-and-Laura years, when I would come home from school to find Mom glued to the tube.

Along with the early Mother's Day presents, this jam-packed issue offers coverage of Wes Anderson's canine stop-motion extravaganza *Isle of Dogs*, framed with painstaking care by Tristan Oliver ("Animal Kingdom," page 50); the seductive spy thriller *Red Sparrow*, shot by Jo Willems, ASC, SBC for director Francis Lawrence ("Seduce and Destroy," page 84); and the historical drama *7 Days in Entebbe*, which reteamed Lula Carvalho, ASC, ABC with director José Padilha ("Daring Operation," page 100).

All of this month's features offer sidebar spotlights on specific tools that proved invaluable for achieving each production's visual style. Schliessler cites Arri's Maxima gimbal rig; Oliver lauds Canon's EOS-1D X DSLR camera; Melanie Mohr, one of three lighting directors working on *General Hospital*, praises Litepanels' LED panels; Willems singles out LiteGear's LiteMats fixtures; and Carvalho details why he used tungsten units to emulate daylight.

Further "enlightenment" can be found in Jay Holben's monthly Shot Craft section (page 16), which offers a primer on LED fixtures, a lesson on lumens, a field guide to power consumption, and tips on using an incident light meter.

On a personal note, I'd like to congratulate Jay and *AC* technical editor Christopher Probst on their recent inductions into the ASC. I could not have been prouder when the Society's board voted to approve Jay as an associate member and Chris (who earned a 2017 ASC Award nomination for his cinematography on David Fincher's *Mindhunter* pilot) as an active member. "The boys," as I call them, have each distinguished themselves for more than 20 years in their professional careers and as contributors to this magazine. Well done, gentlemen.



Stephen Pizzello
Editor-in-Chief and Publisher

Photo by Owen Roizman, ASC.

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PRESIDENT'S **DESK**

Photo by Jacek Laskus, ASC, PSC.

Bending Light

"In wildness is the preservation of the world." — Henry David Thoreau

Nature's admirers often make use of epic language to inspire thoughts of a wilderness exuding beauty and undisturbed by mankind. Thoreau, however, transcends these ideas and focuses on the human need for a freedom that can only be found in the beauty of "ordinary" nature. His talents for drawing attention to the "wildness" of both the natural world and humanity were revolutionary.

I came to think of Thoreau because I wanted to analyze the meaning of light. Light is a strange and powerful phenomenon — in what we do with it as cinematographers, and in reference to the very essentials of life and the intricacies of nature that inspire us as image makers.

Our visual experiences begin when we are newborns, barely able to process shapes but already beginning to connect with the emotional values of contrast and color. In an essential way, the sun itself and the environment around us educate us about light as our visual perception develops.

I have always been fascinated by the notion that Dutch light is somehow unique. Based on the work and reputation of the Dutch masters, many painters of the 17th century traveled from afar to see it firsthand. What was it that made Holland's light so different from the light to be found just a short distance away throughout the rest of Europe?

As noted on the website for the documentary *Dutch Light*, German painter Max Liebermann observed, "The mists that rise from the water and shroud the world in a translucent veil give that country its extraordinarily picturesque quality. … Everything is bathed in light and air." French critic and historian Hippolyte Taine mused, "The air is always hazy, which makes all the contours blurred and indistinct. … What we notice are the nuances, the contrasts, the values and tonality of the colors. The shades of brightness and the gradations of color are astonishing … a delight to the eye."

So maybe it was the abundance of water, which the sun condenses into a fine, humid mist that filters the sky and softens the sunlight while providing dramatic cloud formations and crimson sunsets.

A meticulous study of light was likewise reflected in the work of the late Sven Nykvist, ASC — one of the world's foremost cinematographers, whose poetic use of light illuminated many of Ingmar Bergman's greatest films. The light in those films takes on a metaphysical dimension that goes beyond "mood." It distills and deepens the feelings of torment and spiritual separation that afflict Bergman's characters — and then, in scenes of tranquility filmed outdoors, it offers a glimpse of transcendence.

Winter Light, Nykvist said, was one of the first films in which he deliberately set out to explore light's expressive qualities. The atmosphere he created was inspired by his experience sitting with Bergman in a church for a full day, studying the natural light as it came through the windows and played across the walls. From then on, Nykvist would often spend hours or even days in a location, studying the path and appearance of the natural light, and photographing it with a still camera to create a visual diary.

His work, especially with Bergman, expresses a depth and strength of vision that can be attributed to such meticulous preparation. His style can be as naturalistic as *Fanny and Alexander* and as abstract as *The Unbearable Lightness of Being*.

In its purest form, the light on Earth comes from one source: the sun. When it hits the Earth it gets reflected, bounced and shadowed. When it comes to lighting with an artificial source, I believe we should follow the same pattern. We should let the source play — and then *bend* that source to achieve a desired mood. And if the desire is to deviate from realism, we should respect the source even more. Nature offers the most incredible "unrealistic" patterns of light that can be far more abstract than anything artificially created.

In 1845, Thoreau built his famous cabin on the shores of Walden Pond, where he moved in order to "live deliberately," as he explained in his book *Walden*. The legend of his two years in the woods is that of a lone woodsman-philosopher scraping out a living in the wilderness, pausing on occasion to write down his observations. I find those observations inspiring and revealing. They encourage me to bend the light.

Kees van Oostrum
ASC President

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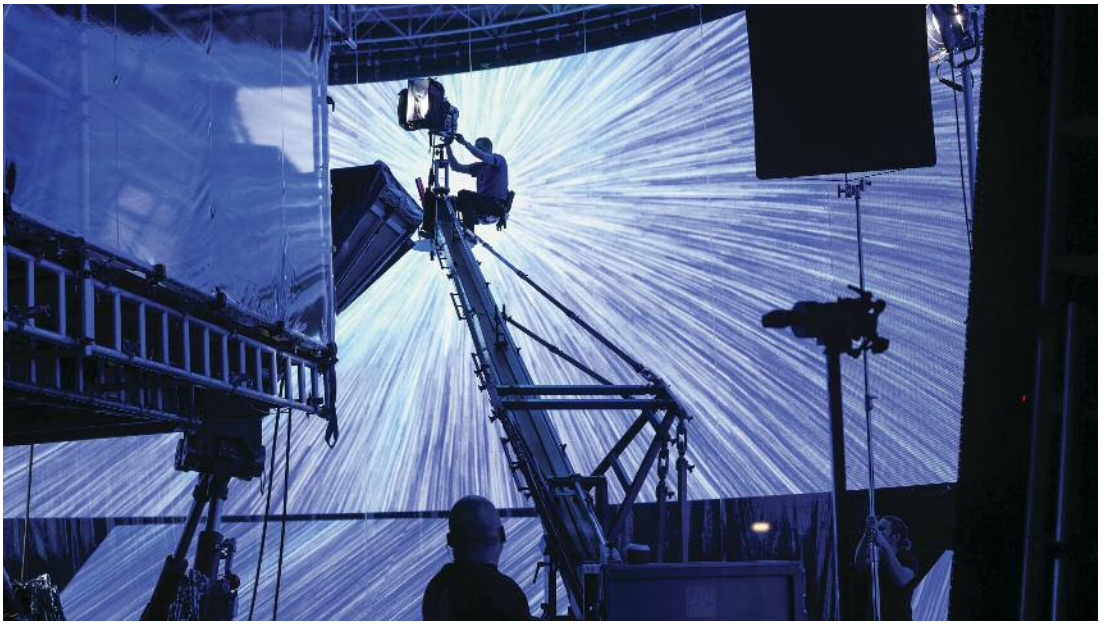

A massive array of WinVision Air 9mm LED panels provide a view of hyperspace for a scene in *Rogue One: A Star Wars Story*, shot by Greig Fraser, ASC, ACS.

How LEDs Work

By Jay Holben

LED is an acronym for light-emitting diode. The modern LED was invented in the 1960s, and initially was only capable of emitting a red light at very low intensity; further advancements paved the way to brighter red, then orange and green. These early LEDs were often relegated to serve as simple indicator lights in electronic devices — like the power indicator on your long-gone VHS player. They required very little energy and were long-lasting.

LEDs create light from an electroluminescence effect in a semiconductor material. To achieve this, the semiconductor is "doped" by adding additional elements that change its properties, so that it can have both a positive region and a negative region. A junction is formed between these two regions, aptly called the P-N junction (positive-negative). In the doping process, the electrons from each atom on the positive side are removed, creating an "electron hole"; this polarity imbalance makes each atom positively charged and eager to find its missing electron in order to bring balance to the Force — er, semiconductor.

When a current is applied to the semiconductor, electrons pass from the negative side, across the P-N junction and into the positive side, where they fall into these "holes," causing the electrons to release energy in the form of a photon, which in turn emits light. So light is thereby produced without heat and without requiring gas to energize the photons, as happens in fluorescent and HMI fixtures. This process is known as electroluminescence or solid-state lighting because the creation of photons happens entirely within the semiconductor.

This also means that the LED is a remarkably simple piece of hardware. There is a cathode and an anode, forming a diode — the semiconductor substrate itself — and an epoxy dome that acts as a lens to concentrate the emission of light.

In 2014 Shuji Nakamura, Isamu Akasaki and Hiroshi Amano were awarded the Nobel Prize in Physics "for the invention of efficient blue light-emitting diodes which has enabled bright and energy-saving white light sources," as the official website for the Nobel Prize explains. The blue LED has paved the way to making brighter and more effective fixtures that have replaced utility fixtures such as sodium- and mercury-vapor streetlights, traffic lights and architectural lights. The use of LED technology for these applications requires significantly less energy. It's estimated that 20 percent of global energy is dedicated to lighting; the sufficient use of LED technology can reduce that number to 4 percent.

Through specific phosphor mixtures, we can alter and control the color of the diode, resulting in LED fixtures that are suitable for photographic use. An "applied phosphor" is one that's applied directly to the surface of the diode, while a "remote phosphor" is placed a distance away from the diode. For our purposes as cinematographers, the important colors are red, green, blue, tungsten (with a CCT of 3,200K) and daylight (with a CCT of 5,600K or 6,500K). Each diode is only capable of emitting a single color; many fixtures today incorporate LEDs of different colors — for example, red, green and blue — enabling the cinematographer to fade between the different diodes in order to create nearly any color of the rainbow from that single fixture.

Phosphors that are placed on the surface of the diode can shift in color output as the diode heats up. Yes, LEDs do create *some*

Rogue One photo courtesy of Lucasfilm Ltd.

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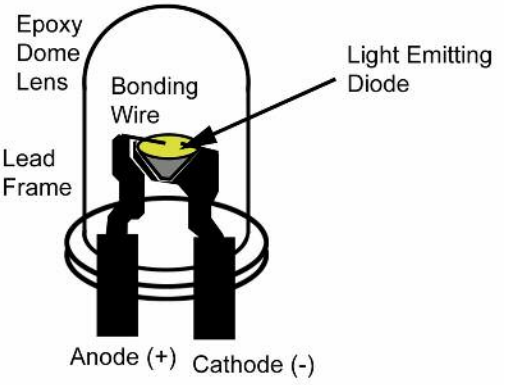
During production of *The Neon Demon* — shot by Natasha Braier, ASC, ADF — key grip Amos James (foreground, wearing headset) creates a watery reflection with the help of a Digital Sputnik LED fixture bounced onto a pan containing broken bits of mirror.



heat — any time electrons are moving around, the byproduct of that activity is heat. Remote-phosphor fixtures, in which the phosphor is placed at a distance from the diode, are less vulnerable to the diodes' heat discharge, but are relegated to only one color for the fixture. Typical remote-phosphor fixtures employ an insert that is coated with the phosphors that set the color; if you need a different color output, you have to replace the insert with one that has a different phosphor coating.

The typical LED is a 5mm cylindrical shape, although they can be larger. The size of the diode isn't directly related to its luminance output — larger doesn't always mean brighter. Brightness comes instead from clustering many diodes together. Most LED fixtures feature hundreds, if not thousands, of individual diodes.

Once the three primary-color LEDs were perfected, large screens could be manufactured with red, green and blue diodes clustered together in "pixel" formations, allowing the screens to display images. Many giant outdoor screens are now made from LED lamps, including PixelFlex, MadEffects' StarvisionLED curtain and Sony's massive JumboTron. These screens go as large as Adi's iConic 100, an approximately 42'x23' LED screen with a 47' diagonal picture — it's a mobile, outdoor television larger than most cinema screens. In fact, LED technology has even begun to permeate movie theaters, with finer diode sizes allowing for the creation of backlit theater screens such as Samsung's HDR Cinema LED screen in Korea.

When it comes to lighting subjects for either stills or motion pictures, the problem with all LEDs is that they do not produce a full, natural spectrum of light, which causes issues with the photographic medium — i.e., film negative and digital sensors. As we've discussed previously in Shot Craft (see "The Fault in Your CRIs," Aug. '17), the lack of color spectrum in the light source results in the inability of the missing color to be reflected on the subject. If it can't be reflected, it can't be seen by the film or sensor — and that can lead to some weird-looking results in your image, like a black strawberry that should appear red. Careful mixing of phosphors can bring an LED close to a natural spectrum, but it is more likely that a fixture will combine several LEDs with separate phosphors and spectrum outputs to create a more complete, simulated, natural-looking spectral output.

LED technology is on a rapid curve,

Some (But Not Nearly All) of the LED Fixtures Available Today

RGB+W (also RGB+WW):
(These feature a combination of red, green, blue and "white" diodes, the latter of which can be tungsten, daylight or both)
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- Arri SkyPanel
- Digital Sputnik DS
- Digital Sputnik Voyager
- Kino Flo Celeb
- Kino Flo Diva-Lite LED
- Kino Flo FreeStyle
- LiteGear LiteRibbon
- Litepanels Gemini
- NBCUniversal LightBlade
- RoscoLED Tape VariColor

Remote Phosphor:
- BB&S Area 48
- BB&S Pipeline
- Cineo Maverick
- Cineo TruColor HS

Multi-Diode Daylight/ Tungsten:
- BargerLite LED
- Fluotec StarMaker BiColor ProductionLED
- LiteGear LiteMat
- Litepanels Astra Bi-Color
- Litepanels Croma 2
- Mole-Richardson MoleLED Variable-Color
- Rosco DMG Lumière Switch

Single Diode/Single Color:
- Fluotec AuraLux and VegaLux StudioLED Fresnel
- Mole-Richardson MoleLED Fresnel
- Visionsmith ReLamp LED

The Neon Demon photo courtesy of Amazon Studios.

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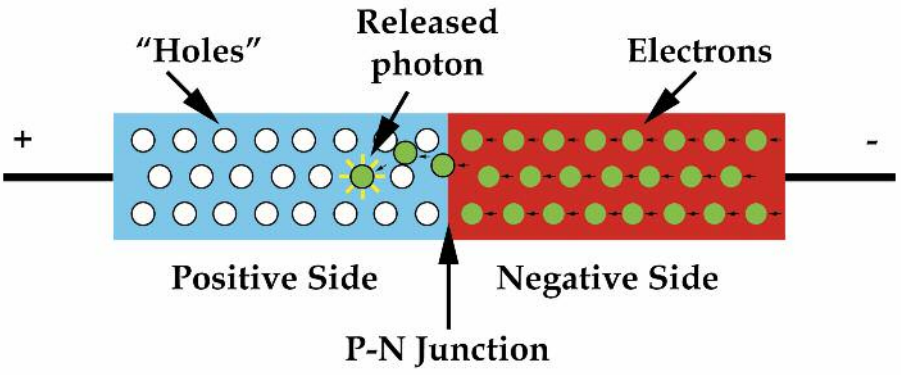

An LED incorporates a semiconductor that's been "doped" to have a positive region and a negative region. When a current is applied, electrons pass from the negative side to the positive side, where they release energy in the form of a photon, which in turn emits light.

increasing in brightness and decreasing in cost. In little over a decade, we have gone from small onboard LED fixtures that sit atop the camera, providing a bit of fill, to units that can match the output of a nine-light Maxi-Brute. Features such as *Independence Day: Resurgence*, photographed by Markus Förderer, BVK (*AC* July '16), and *Rogue One: A Star Wars Story*, shot by Greig Fraser, ASC, ACS (*AC* Feb. '17), made extensive use of multicolored LED fixtures, which allowed the cinematographers to alter the color and intensity of those lights nearly instantaneously.

The savings to the production can

Deep Focus

The Need for Lumens

For years, cinematographers, gaffers and electricians have identified lighting by wattage. "I need a 650 over here and a 1K there, and give me a 5K outside that window." That's a 650-, 1,000- and 5,000-watt fixture, respectively. Lighting professionals know, intuitively, what kind of illumination levels we'll get from a specific wattage tungsten fixture.

When HMI came on the scene, we continued to identify the sources by their wattage — for example, 1.2K, 4K and 12K HMIs. We did this even though, per watt, HMIs are substantially brighter than their tungsten counterparts. But this was a conceit that everyone understood and mentally accounted for. If you needed the output of a 5K tungsten from an HMI, you knew to ask for a 1.2K instead.

With the arrival of fluorescent fixtures for motion-picture lighting, the correlation between wattage and output was suddenly very different. A 23-watt tube puts out how much light? So, instead, we started identifying fluorescent units by the length and number of tubes in the fixture. As in, "Give me a four-by-four over there and a two-foot four-bank in the corner."

And now LEDs are here, and wattage has been flung even farther out the window in terms of being a useful descriptor. No one really knows quite how to identify these fixtures.

What is required is a change in our thinking — a move away from wattage to a universal terminology that remains consistent across all types of lighting fixtures: lumens. The lumen is an English measurement of brightness that is exactly equal to the footcandle, defined as the amount of illumination produced by one candle at a distance of 1'. It is a consistent form of intensity measurement, regardless of the light source or its power consumption.

Lumens have already begun to take hold on the consumer level. Consumer packaging for all types of luminaires feature the actual wattage of the lamp, the equivalent wattage in a standard tungsten lamp, and the lumen output. It's that last part that we need to adopt in motion-picture lighting.

While some manufacturers of motion-picture lighting equipment have started to incorporate this in their specs and photometrics, overall our industry has been slow to change. This change is necessary, though, as wattage has become both outdated and, frankly, inadequate for identifying a fixture's lighting output. Wattage only describes the amount of energy necessary — the product of amperage and voltage — to power a light source. HMI, fluorescent, LED and plasma lighting fixtures have substantially lower wattage ratings for substantially higher light outputs than tungsten bulbs.

So we need to learn to say, "I need 7,000 lumens here and 1,000 lumens there." In truth, it's a return to old-school methods of communication. Cinematographers used to regularly ask gaffers for a certain footcandle level in a given portion of a scene. Everything old is new again.

Of course, as noted, the lumen, or footcandle, is an English system of measurement. The metric measurement is the lux; 1 lux is equal to 1 lumen over a 1-square-meter area. It's almost the same thing, except that 1 square meter is equal to 10.76 square feet. So:

1 lux = .09 footcandles or lumens

By way of example, the chart below compares various lumen outputs and the relative wattage equivalents of consumer incandescent bulbs, CFLs and LEDs.

Lumens	Incandescent	Compact Fluorescent	LED
450	40 watts	9-13 watts	4-5 watts
800	60 watts	13-15 watts	6-8 watts
1,100	75 watts	18-25 watts	9-13 watts
1,600	100 watts	23-30 watts	16-20 watts
2,600	150 watts	30-55 watts	25-28 watts

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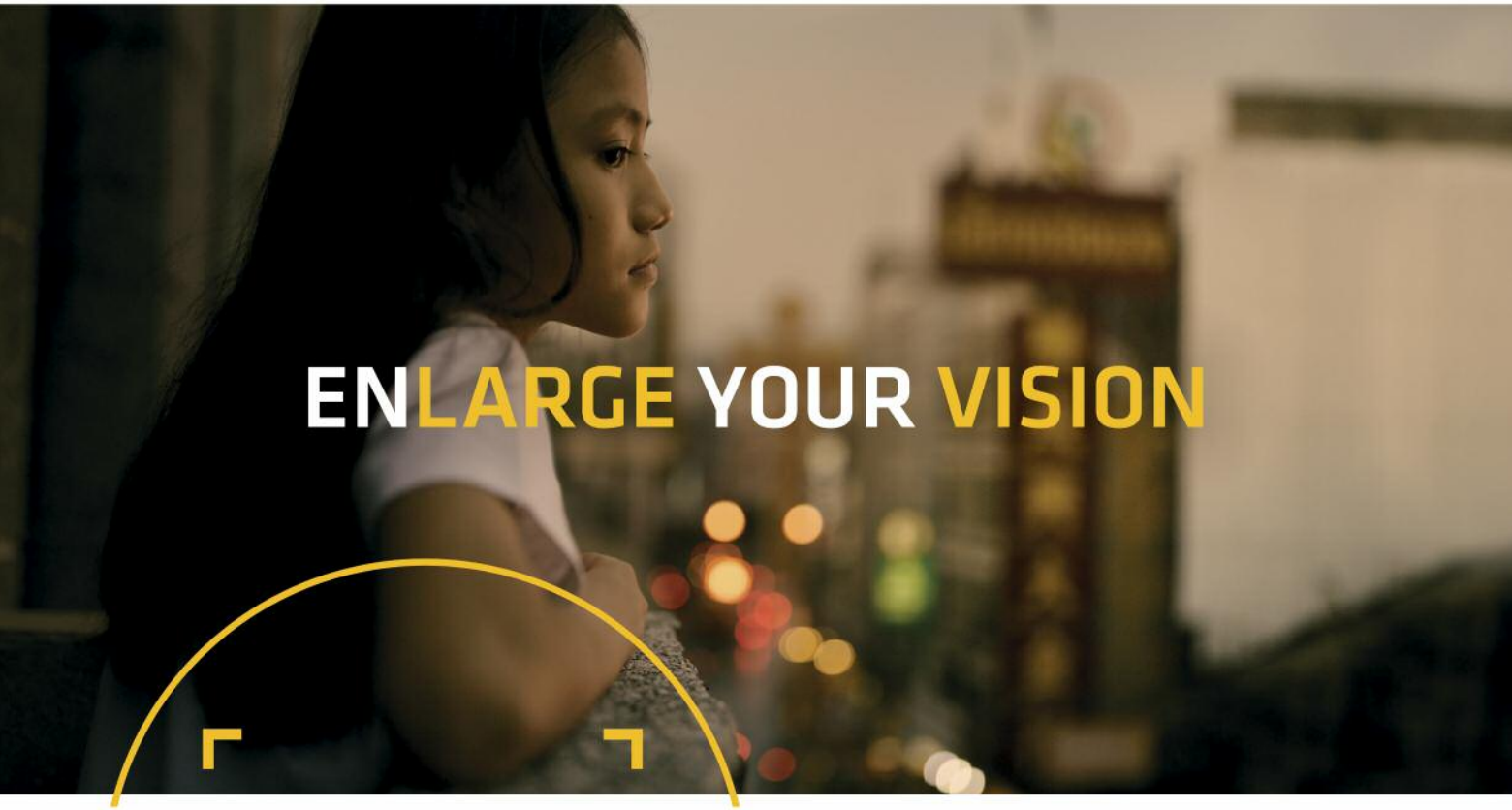

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also be substantial. Electrical usage — generator fuel or kilowatt-hours charged — decreases; air conditioning costs are reduced, as there's no need to combat the heat generated from incandescent sources; the expendables budget goes down, since color-tunable LEDs do away with the need for colored lighting gels; the crew saves time, since no one needs to climb into the perms to scrim a fixture or swap out a gel; and pre-rigging time and hardware requirements are mitigated thanks to lighter-weight fixtures and simpler DMX cabling. It all adds up very quickly.

LED technology continues to evolve. It is not yet a perfect medium — but it is certainly a lighting solution that is here to stay. ●

Field Guide

Power Consumption and Alternate Light Sources

Traditional tungsten fixtures are incandescent sources of light — incandescent meaning "light from heat." In order for an incandescent source to produce light, electricity passes through the tungsten filament, which resists the electrical flow of electrons; the friction of that resistance in turn causes the element to heat up until it eventually gets hot enough to glow.

This process produces beautiful light, but at the cost of considerable energy being lost to the generation of heat — 70-80 percent of the energy used by a tungsten light bulb is lost to heat. A naturally occurring metal, tungsten is a very brittle substance with the highest melting point of non-alloyed metals, and the second highest melting point of all elements on the periodic table: 3,422°C, or 6,192°F. This makes it the perfect source of incandescence, as the standard tungsten filament can heat up to temperatures of more than 5,000°F. That's super hot — and it results in the expenditure of a lot of energy, which means it takes more electricity to produce a given amount of light from a tungsten fixture than it does from other sources of light.

Fluorescent lighting, for example, requires significantly less energy. Instead of "light from heat," it's produced by means of an arc of electricity that excites mercury molecules suspended in gas inside the tube; the excited mercury then strikes phosphors that coat the inside of the tube and creates light, aka fluorescence. The greater the surface area of the fluorescent tube, the brighter the source of light. This is why compact fluorescent bulbs have those tight curls to them: Those curls create more overall surface area and, therefore, a brighter output. Although fluorescent fixtures require a ballast to regulate the arc of electricity inside the tube, they need relatively low electrical current to function — about 60-70 percent less electricity than a tungsten lamp with an equivalent brightness.

LED fixtures are even more efficient in their electrical usage per lumen. The movement of the electrons within the light-emitting diode creates its own light, with little to no wasted energy. This efficiency means that for the equivalent output of a tungsten bulb, an LED fixture uses up to 80 percent less energy.

One of the woes of location shooting, especially on small productions where you can't afford a generator or a qualified electrician to tap into existing power, is being limited to wall-socket power in the 15-amp or, at most, 20-amp variety. (See Shot Craft, "Keeping the Lights On," *AC* March '18.) This limits you to, at most, a 2,000-watt fixture — which is definitely pushing the limits of safety. In the HMI world, you're limited to a 1,200-watt fixture or perhaps the 1,800-watt Arri M18, which was specifically designed to be the most HMI output you can get on 20-amp "household" power. Where you get the most bang for your buck — the highest output with the lowest energy consumption — is with fluorescent and LED fixtures.

Energy in this sense is wattage. If we recall the "West Virginia" law — watts = volts x amps — we can see that while voltage remains a constant, if we reduce the wattage, we also reduce the amperage.

If a 100-watt tungsten bulb produces approximately 1,600 lumens of illumination, it also consumes 1 amp of electricity (assuming a 100-volt system). If a 1,600-lumen fluorescent fixture only requires 25 watts of power, then it only consumes .25 amps. The same 1,600 lumens can be produced by an LED fixture at 15 watts, which is only .15 amps. So we're using significantly less electricity for the same general amount of light.

Scaling this up, imagine that you're lighting a scene where you would normally use a 2K tungsten soft light — that's 20 amps of electricity. The same brightness of light from a fluorescent fixture requires only 750 watts, or 7.5 amps. With LEDs that's about 400 watts, or 4 amps.

You can quickly see how utilizing alternate power sources not only saves electricity, but allows you to light brighter scenes with available power.

— JH

From left: A Mole-Richardson 2K tungsten Fresnel, an Arri M18 1.8K HMI, a Kino Flo 2' 4Bank fluorescent fixture, and LiteGear LiteMat LED units.

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Tech Essentials
Using an Incident Light Meter

The light meter is a wonderful tool that still has a strong place in today's heavily digital production environments. However, as more and more cinematographers are entering the industry without having had the opportunity to expose film, techniques for using light meters have started to wane.

The incident light meter is one of the most common handheld meters available. As noted in a previous Shot Craft ("To Meter or Not to Meter," *AC* Dec. '17), it measures the incident light falling onto the meter, before the light hits the subject to be photographed. This type of meter is easily recognized by its "half ping-pong ball" light-gathering hemisphere, which is designed to approximate the curvature of the human face and is intended to average the light levels falling on it. Place the hemisphere in front of the subject's face, pointing toward the lens, and take a reading; this reading will average-out the light levels striking the hemisphere and give an f-stop reading correlating to the aperture setting on your lens for "proper" exposure of the subject. This is a fine technique for an average exposure — but it leaves a lot to be desired in the way of creative control.

A more refined methodology with an incident meter is to measure each light source, independently, that's striking your subject. In a classic three-light scenario, you would measure your key, fill and backlight separately. To do this, you place the meter at the subject's position, but instead of facing the hemisphere toward the lens, you face it toward a single light source that's illuminating your subject and take a reading of that source alone; this often requires shading the ball to eliminate any stray light from a source other than the one you're trying to read. Then, if your meter has one, you can set that measurement into the meter's memory function and move on to the next source, and then the next. Armed with this knowledge, you can then decide for yourself where you want these values to fall in the overall exposure of the scene.

I generally underexpose Caucasian skin tone about a stop to a stop-and-a-half under "key" — which, in this case, refers to the stop at which I set my lens. I rarely, if ever, set any particular value in the scene actually at key. Instead, I tend to place skin tones under key and highlights over key. To my eye, this results in a much more refined look.

By individually measuring each light as a separate value, you provide yourself with a great deal of information to fine-tune your lighting. Is your backlight reading 2 stops hotter than your key light? Is that too much? If it is, you can easily ask your gaffer to drop a double in the appropriate fixture to drop the backlight's intensity to just a single stop over the key light. If you hadn't measured the lights individually, you wouldn't be able to make this decision nearly as quickly or methodically.

Some meters allow you to remove the "ping-pong ball" and replace it with a flat disc, or to retract the ball inside the face of the meter to mimic a flat disc. This makes the measuring of individual fixtures much easier, as it requires less shading from stray light.

As odd as it may seem, it is also very effective to take meter readings where there aren't actually any lights. Perhaps your talent is merely lit from a window. You take a reading from the subject's position toward the window to get your "key light" reading, and then take a reading on the shadow side of the room — facing away from the window — to measure the amount of ambient light bouncing around the room. Even without a light source facing the shadow side, the ambient light will often be enough for your meter to give you a reading.

This is an important technique for determining the ratio of the key to shadow side of your subject. Knowing the dynamic range of your camera and the look you intend to create will inform whether or not you need to add a bounce or some fill for the shadow side. If that shadow side is 8 stops under the key but you want to see detail in that side of the face, you know you have to add some fill.

Understanding the dynamic range of your medium is critical to understanding how to handle your exposures. To that end, I have a favorite technique that I use in metering that nearly every digital meter is capable of. Often I know the stop at which I want to shoot my scene; I'll choose it ahead of time to control the depth of field in the scene. If I know I want to shoot a scene at T2.8, for example, I'll use my meter and take measurements around me until I get exactly 2.8 on the meter, and then I'll lock that into the memory. It doesn't matter where I measure that 2.8, just as long as I get the meter to read it somewhere. Then, with that reading set in memory, I put the meter into "average" function — so now, whenever I take a reading on set, instead of showing me the f-stop value for that reading, the meter will show me how many stops above or below the memory setting this reading is. This will instantly tell me if my key light is 1⅓ stops over, for example, or my shadow side is 1 stop under, or my backlight is 2 stops over. This is an extremely quick and easy way to dial in the ratios — so easy, in fact, it almost always feels like cheating!

— JH

Bruno Delbonnel, ASC, AFC takes an incident-meter reading on actor Oscar Isaac during production of the feature *Inside Llewyn Davis*.

Inside Llewyn Davis photo by Alison Rosa, courtesy of CBS Films.

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SHORT **TAKES**

Set in the near future, the short *The Last Dance* tells the story of Hugo (Richard Syms) as he engineers a holographic re-creation of a precious memory of his late wife, Sophie (Sharea Samuels).

Holographic Memory

By Phil Rhodes

The narrative of writer-director Chris Keller's short *The Last Dance* is disarmingly simple. For a piece that's heavy on visual cleverness, it is, as cinematographer Ed Moore describes it, "a really sweet little story with a sci-fi twist." The short runs for just under eight minutes and depicts a near future in which lead character Hugo (Richard Syms) engineers, in his garage, a spectacular holographic re-creation of a fond memory. While the director's visual-effects background might lead viewers to expect a lot of computer-generated imagery, the filmmakers actually achieved much of the desired effect practically.

A role in the creative industry might have seemed inevitable for Moore. As the son of an actor, he explains, he had "been around film sets and lots of theaters. I started working in theater lighting, operating followspots and that sort of thing, and I loved it. I wanted to carry on with theater-lighting design, but I ended up getting a job with ProVision, the film rental company in Leeds. I spent several months working in the lighting-rental department and became interested in film lighting. In between loading lighting trucks, I used to light my own little scenes in the warehouse to become familiar with the kit."

Having founded a small production company while attending university, Moore says he "never even graduated. The company got bigger and bigger, from little, tiny corporate promos to commercials. I was always the 'camera guy.' I realized I wouldn't get into the actual industry doing that, so I went freelance as a cinematographer in 2009."

Moore considers the 10th season of the science-fiction comedy series *Red Dwarf* to have been his big break. "They hired me as B-camera and Steadicam operator and second-unit cinematographer. From that point, it was about gradually working up." Upon ascending to director of photography, Moore returned to *Red Dwarf* to shoot a total of 12 episodes. Further cinematography credits include the series *Shetland*, *Vera*, *Hold the Sunset* and *Drifters*; commercials for brands including McDonald's and Mars; and the feature *The Last Showing*. His 2nd-unit work includes such productions as *Doctor Who*, *Poldark*, *Our Girl* and *Mapp & Lucia*.

Moore's involvement in *The Last Dance* stems from his work as 2nd-unit director of photography on *Atlantis*, where he met producer Oliver Milburn, who was working as a visual-effects assistant. Milburn connected Moore to Keller in the summer of 2016, when preparation for the short was already well underway. Moore recalls, "He'd already produced beautiful digitally painted mood boards. The script was all there and a lot of the music was in place. It was a really easy decision to get on board. Many short films are a bit 'kitchen-sink,' whereas this was really visual at its heart, but it wasn't visual effects for visual effects' sake."

The Last Dance was shot over two days in November 2016, with a day's pre-rig for the practical hologram effects and a morning's work to cover the wedding scene. The production used Red's Epic Dragon 6K camera with Arri/Zeiss Master Prime lenses. Moore is quick to thank supplier Pixipixel for its generosity: "Toby Newman at Pixipixel was ludicrously kind to us."

The choice of lenses was driven largely by a simple desire for speed, and Moore makes clear that Keller's visual-effects savvy didn't

Images courtesy of the filmmakers.

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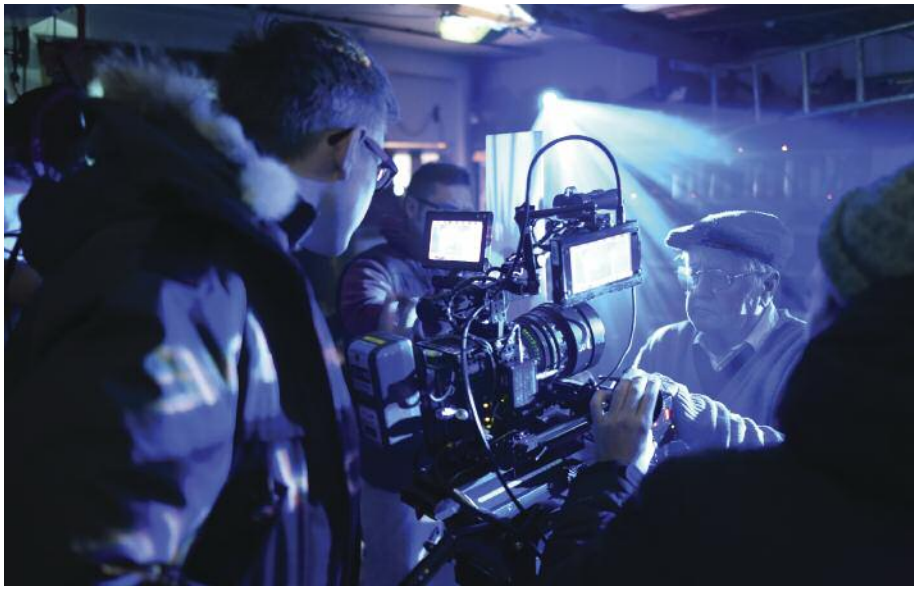
Above, from left: Director Chris Keller, cinematographer Ed Moore, focus puller Jack Mayo and electrician Ryan Monteith ready a shot of Hugo at work in his garage. Right: Samuels stands in front of greenscreen for a shot of the Sophie hologram. Below: Moore frames a close-up of Syms.



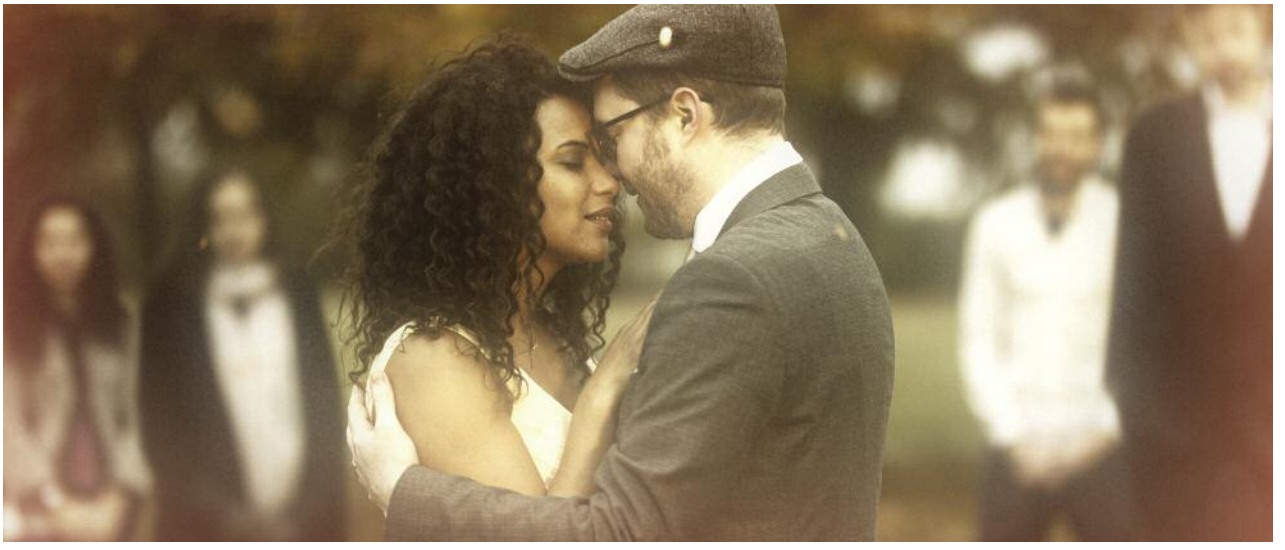
lead the director to limit the options. "If I'd wanted to shoot on some crazy old lens, it would have been no problem for Chris, [but] we both agreed that Master Primes were the right look," he says. "I love Master Primes, and for this one I needed the stop to get the most out of the projectors and lasers."

The principal source of artificial light for both the garage interior and wedding exteriors was a 5K tungsten Molebeam. The effect of the 5K is particularly clear in the garage scene, for which an electrician manually moved a flag to simulate the motion of a mechanical shade on the window. Other lighting equipment included LiteGear LiteMats and an Arri SkyPanel.

"I always use my own [Convergent Design] Odyssey7Q monitor on camera," Moore notes. "We kept it simple; we would loop everything through the Odyssey. I have it set up to auto-record ProRes LT. It's a touchscreen and you can just scrub through the clip using the full width of the screen, which is quite a good way of getting to a moment in that clip quickly and accurately — 'What was that eyeline from three scenes ago?'" Digital-imaging technician Alix Milan of I Love Hue Ltd. used a USB 3.0 reader for the camera media and an Areca 8050T2 RAID connected via Thunderbolt 2, with Pomfort Silverstack XT to coordinate backups and Blackmagic Design DaVinci Resolve 12.5 to create graded dailies. Milan's precision monitor of choice is Flanders Scientific's DM240.

"Chris' level of visual-effects expertise is so high that it was never an issue to establish if we had to shoot in a certain way, limit how we shoot things, or think about using greenscreen," Moore says. "Chris has a background in gigantically visual-effects-heavy films, and he knows every trick in the book. He also understood that the success of the digital hologram would depend on practical lighting and smoke. We were able to shoot as if the holograms were right in front of us; [almost] everything was composited with no use of greenscreen and limited tracking markers. I'm pretty proud that much of what you see of the hologram effect was pretty much done in camera. It was sweetened a bit with the big geometric grids that fly out."

Practical effects were coordinated with the help of Ziggy Jacobs-Wyburn, a



Top: A young Hugo (Nigel Thomas) dances with his wife. Above: Moore employs a dolly on a circular track to capture a 360-degree move around the couple.

lighting-console operator whom Moore had "worked with on *Red Dwarf*, which would have been the end of 2015 into 2016," the cinematographer says. "She's an utter genius when it comes to lighting control. She's a computer programmer as well; she was the perfect person. Ziggy and gaffer Nick Dale were the first people I spoke to when I came on the project."

Moore explains that it was Jacobs-Wyburn who had the connection with Bristol-based Enlightened, "and we went down there in the summer to shoot some tests of what [theatrical lighting equipment] might work. We ended up using a combination of video projector with geometrical video content, which Ziggy and Chris created, and Martin Mac 250s that provided a beam-projecting effect. We added some DMX lasers, which were inexpensive but very effective. We were all of the belief that it would take a range of effects coming together to make something believable.

"We had to choose," Moore notes. "I think we wanted 10,000-lumen video projectors, and we had to decide between having one 10K projector or two 6K projectors. We thought it would be more valuable to have two beams intersecting. It was fun to imagine how this hologram technology would work 'in real life.'"

The final configuration was controlled via an ETCNomad lighting console, which had domain over the lasers and Mac 250s. Video content was served from Figure 53's QLab software, under OSC control from the ETCNomad. Haze was employed, as well as Martin's Jem Glaciator heavy-fog machine for thicker fog effects. "Back-timing all those effects was so much easier when it was a proper cue stack off a lighting desk," Moore enthuses. "We would run the full dance sequence all the way through on each take, to guarantee the timing of each effect."

The short's postproduction effort was managed by Keller with the assistance of his colleagues in the visual-effects industry — particularly the team at Double Negative, which was involved in both the onscreen CG delivery drone and hologram effects. Software included SideFX's Houdini for 3D work, Foundry's Nuke for compositing, and Brekel Pro PointCloud to capture a 3-dimensional model of actor Sharea Samuels' performance. *The Last Dance* was graded and finished in Nuke and Adobe's After Effects by Keller himself.

At the time of writing, Keller was working as digital-effects supervisor in Vancouver on the final stages of *Pacific Rim Uprising* while completing post on his next short and prepping future projects. Meanwhile, Moore has just begun prep on a new thriller series, *Dark Heart*, for British broadcaster ITV. ●

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Across the Universe

Tobias Schliessler, ASC, joins an ensemble effort to realize director Ava DuVernay's richly layered big-screen adaptation of *A Wrinkle in Time*.

By Michael Goldman

•|•

Tobias Schliessler, ASC calmly picks at his salad while taking a break from the grading on director Ava DuVernay's *A Wrinkle in Time* at EFilm in Hollywood. His relaxed demeanor belies the fact that, in the face of the looming delivery deadline, his workday is far from finished. As he explains, this is the day "we absolutely have to be done with the first pass on the digital intermediate. I'll be here until at least 2 in the morning."

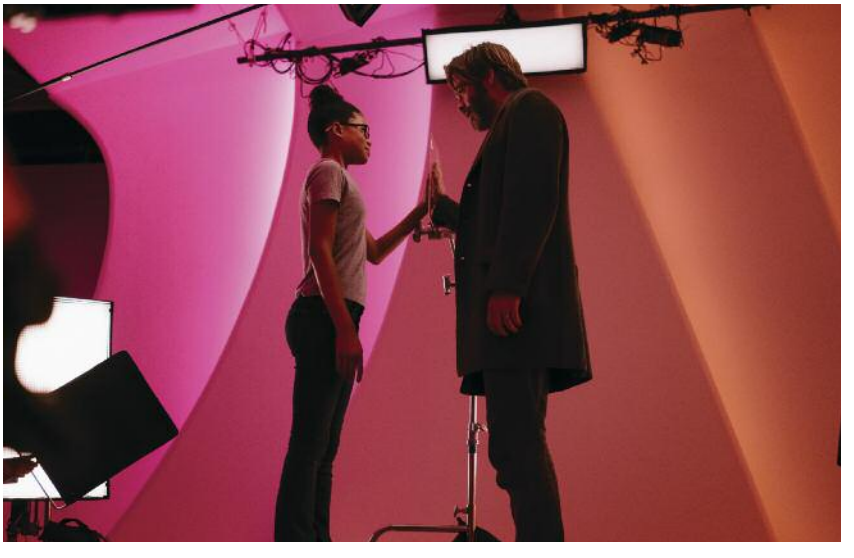
With its massive scope and complex visual design, *A Wrinkle in Time* is "an extremely collaborative project." Just as Schliessler says this, DuVernay pops into the room to give the cinematographer a hug. She also takes a moment to explain her general approach to the project, and why she sought to push the proverbial envelope with its visuals. "It's a movie for kids and family, but we had to do that with a little extra 'oomph,'" she says. "That was my goal. And to do that, you have to take risks and be bold."

The movie is based on Madeleine L'Engle's classic novel about a young girl, Meg Murry (played in the feature by Storm Reid), who turns to three celestial beings — Mrs. Whatsit (Reese Witherspoon), Mrs. Who (Mindy Kaling) and Mrs. Which (Oprah Winfrey) — to guide her on a journey through the cosmos in search of her missing scientist father (Chris Pine). Accompanied by her younger brother, Charles Wallace (Deric McCabe), and friend Calvin O'Keefe (Levi Miller), Meg travels to a series of strange planets.

"Every 10 minutes or so, there's a different planet," DuVernay explains in a later phone interview with *AC*. "I told Tobias, 'I need all of them to be similar yet different. I don't want to rely on production design [exclusively] for that.' I described what I wanted the images to look like and feel like in very detailed terms, and I gave him references, both photographic and cinematic.

Opposite: Accompanied by her brother, Charles Wallace (Deric McCabe, center), and friend Calvin O'Keefe (Levi Miller, left), Meg Murry (Storm Reid) embarks on a journey through the cosmos to find her scientist father in *A Wrinkle in Time*. This page, top, from left: Mrs. Who (Mindy Kaling), Mrs. Which (Oprah Winfrey) and Mrs. Whatsit (Reese Witherspoon) aid Meg in her quest. Below: Cinematographer Tobias Schliessler, ASC (third from left), director Ava DuVernay (center) and crew plan a shot. Bottom: Meg reunites with her father, Dr. Alex Murry (Chris Pine).

"I had a real stew of images I was prepared with," DuVernay adds with a laugh. "[Japanese animator Hayao] Miyazaki was a big reference. The question was, 'How do you put that in a Disney picture without folks freaking out?' What were the parts of that imagery and that approach that we could translate into live action? You try to put that all through a 'Disney' lens and see how those images fit on a Disney landscape. I decided to push it as far as I could, but still stay within a realm where kids and families who are used to that brand could feel like they were comfortable."



For her features *Middle of Nowhere* (*AC* Nov. '12) and *Selma* (*AC* Feb. '15), DuVernay had partnered with cinematographer Bradford Young, ASC. His commitment to shoot the upcoming *Solo: A Star Wars Story* precluded his involvement in *A Wrinkle in Time*, so the director turned immediately to Schliessler. "Tobias was the first person who came to mind," says DuVernay. "In my previous career, before I was a filmmaker, I was a publicist, and I was a publicist for *Dreamgirls* [which Schliessler shot for director Bill Condon; *AC* Dec. '06]. I watched Tobias on that set, and I thought, 'He's cool, he's calm, he's

Unit photography by Atsushi Nishijima, courtesy of Disney Enterprises Inc.

Across the Universe

A brilliant physicist, Alex discovers that time can be "wrinkled," enabling interplanetary travel in the blink of an eye.

collected, he's focused.' And when I saw the film, I thought it was gorgeous, especially the way he lit black skin, which is not easy. It was important to me to have a cinematographer who could light different skin tones. Mindy Kaling has a darker skin tone than Storm Reid, and they are standing in the same frame with Reese Witherspoon and Oprah. I knew Tobias could make all that shimmer and shine — and he did."

Due to the volume of visual effects — totaling more than 1,300 shots in the finished movie — Schliessler opted to shoot the movie using Arri Alexa XT and Alexa Mini cameras, capturing data in the ArriRaw format in Open Gate sensor mode with spherical lenses: CW Sonderoptic's Leica Summilux-C primes and Fujinon's 14.5-45mm (T2.0), 18-85mm (T2.0), 24-180mm (T2.6) and 75-400mm (T2.8-3.8) Premier PL zooms. "Using the Open Gate mode gave the visual effects some wiggle room, if needed," explains the cinematographer, who worked with Keslow Camera for his camera and lens package.

He adds that many of the choices he made for the 75-day production revolved around the fact that three of the lead actors were minors, which meant their availability on set was limited. "We were allowed to have the kids on set eight hours a day, but they had to do three hours of schooling, so we only really had them for five hours," Schliessler relates. "With certain scenes, we had to shoot quickly and reframe fast. Because of that, we ended up using zoom lenses more than I normally would. That's also why we ended up shooting two, sometimes three cameras at the same time — cross-shooting, whatever needed to be done."

Another major challenge was that, given the elaborate nature of the various worlds, many of the sets were essentially too big for the available stages at Santa Clarita Studios, and were often built right up to the ceiling.

Top and middle: Meg's classmates, as well as Principal Jenkins (André Holland), see her as a troublesome outcast. Bottom: Schliessler peers through a polarizer as the crew preps a late-day exterior on the basketball courts outside Meg's school.

"It was impossible to get to some of the lights," Schliessler recalls, "so we used a lot of remote-controlled lights, a lot of theatrical lighting [and] LED solutions.

"I have experience doing such lighting on portions of shows like *Dreamgirls* and *Beauty and the Beast*," the cinematographer continues, "but just using it as a tool — and not because the light was designed to be theatrical — was new for me. I don't think we would have been able to light 'normally' on these stages without this ability.

"I think [our approach] illustrates the industry's continued push down the road of LED lighting," Schliessler adds. "We used Arri SkyPanels in our soft boxes and space lights, allowing us to change color and intensity on the lighting board or through an iPad. I can't imagine going back to the old way of doing it; the control we have now is unbelievable."

To move the camera, the cinematographer says he used "a combination of everything," including various cranes and Steadicam, as well as Arri's Maxima gimbal rig that proved crucial for several sequences — such as a chase through a dark, living forest, shot on

Gear Spotlight: Arri Maxima

Tobias Schliessler, ASC had never used Arri's Maxima lightweight, three-axis, electronically stabilized handheld gimbal rig before working on *A Wrinkle in Time*, but he had recently seen a sequence shot by his friend Jon Joffin, ASC, for which Joffin had put the rig through its paces. Adopting it for *Wrinkle*, Schliessler says he found the Maxima to be "an incredibly helpful tool. When you have kids running full speed through and between trees, and over fallen trees, you could never run that fast with a Steadicam in that terrain."

Schliessler is referring to the movie's forest chase — one of a number of sequences for which the Maxima proved useful. For the forest chase, the cinematographer continues, "We built a 5-foot long pipe and simply underslung the [Maxima] with the Alexa Mini on it. Stunt coordinator Stephen Pope and I held on to either side and ran forward, with the camera facing backward, with the actors basically chasing the camera. [A-camera operator] Lucasz Bielan operated wirelessly with remote wheels. It allowed us to get shots we wouldn't have been able to get with a Steadicam."

Bielan adds that the Maxima was a perfect complement to the Steadicam, which also saw its fair share of use on the production. "[The Maxima] allowed us vertical movement from very low to higher angles, something that the Steadicam is limited with. We mounted it on the pipe, and I also wore it on an Easyrig. That allowed us to get wide, sweeping shots [in locations where] it would have been too big of an ordeal to bring in cranes." Even on stage, the operator adds, "surfaces were often uneven, and [the Maxima] saved us the time it would have taken to build a track, dance floor, or another surface for the Steadicam."

— MG

Across the Universe

Lights are put into position for a night exterior outside the Murry house.

location in the redwoods of Northern California (see sidebar at left). That particular sequence also relied on a Spydercam cable run and "every other moving rig available," according to Schliessler. "In areas where we had room between the trees, we also used an Aerial Mob drone for some exciting counter-moves, to add speed to the chase. And when there was a path next to the run, we had a camera on a Grip Trix electric car, with a small jib arm and Libra head."

To enable the capturing, managing and monitoring of data both on stage and on location, digital-imaging technician Maninder "Indy" Saini's cart included two 25" Flanders OLED monitors and a 17" Sony OLED; two Leader LV5333 waveform monitors for exposure and color-signal monitoring; Convergent Design Apollo multi-camera recording monitors, which allowed Saini to record every setup, for matching various angles and for later reference; Fujifilm IS-mini LUT boxes; a Blackmagic Design Smart Videohub router; a 15" MacBook Pro with Retina Display; Pomfort's LiveGrade Pro color-grading software; and Preston single-channel Focus-Iris controls for each camera.

"The monitor feed from camera was an un-color-processed Log C signal," Saini explains. "I used LiveGrade Pro coupled with the IS-mini LUT boxes to create looks live, in the moment, during the shoot.

"When prep on the film started, I worked with Tobias to create a base [CDL] that we could start with each day," Saini continues. "Then, through discussion with Company 3, I used Arri's standard K1S1 LUT as a base, and then I applied the base CDL that Tobias and I created during prep. From there, I would adjust the CDL to craft whatever look he was going for in a given scene, adjusting CDLs per camera to match the A-camera's look."

Saini also created a base show LUT for the SmallHD monitors that the focus pullers used. "They were also getting the Log C signal," she explains. "Their HD monitors could store looks in them, so I took the [K1S1] LUT and the base CDL and made a new LUT as the base show LUT, loading it into all the focus pullers' and operators' monitors. They weren't getting live color updates, but they were working off a look that was in the zone."

Dailies were handled by EC3, the dailies unit for EFilm and Company 3; colorist Adrian DeLude worked with Colorfront's On-Set

Dailies color-correction system. "We made backups of the data on set, then sent the mags to EC3 at lunch and end of day," Saini details. "I would email my CDLs to post at those designated breaks when the mags would travel, and EC3 would create and distribute dailies to the predetermined designations. We would get calibrated iPads back the next day with the previous day's work. Tobias and I would go through those iPad dailies during down moments, in the tent."

To help navigate the shallow depth of field in what Schliessler describes as "some very tricky focus shots," A-camera 1st AC Paul Santoni embraced Preston's Light Ranger 2 focus-assist system, which could overlay graphics onto the focus puller's monitor. Santoni calls it "a breakthrough technology for focus pulling. It makes following focus much more precise."

Before the story launches across the cosmos, the filmmakers strove to imbue the earthbound locales with a gray, emotionally unsettling aesthetic, underscoring Meg's sense of loss over her missing father. "But that look was difficult to achieve while shooting exteriors in sunny Los Angeles," Schliessler points out. "I had to create that feeling with the help of our DI colorist, Mitch Paulson, to desaturate the colors and give it a cooler look."

Meg, Charles Wallace and Calvin fly from a backyard on Earth to another planet by way of the so-called "tesser" process — and all the adventures that follow transpire "in the blink of an eye," Schliessler explains. DuVernay wanted that moment on Earth to take place during magic hour, so that when the characters later return, it would be on "a happy note," the cinematographer adds. "But it was hard to control light [during sunset] on our location. That resulted in our moving from the location backyard to a backlot so that we could control ambient light with overhead diffusion. The key light for our sunset there came from Maxi-Brutes on lifts

Meg's mother, Dr. Kate Murry (Gugu Mbatha-Raw) helps explain her missing husband's theory, which posits that a straight line is not the shortest distance between two points.

Across the Universe

Top: Mrs. Whatsit welcomes Meg to the planet Uriel. Above left: DuVernay studies the monitor while shooting a Uriel scene on location in New Zealand. Above right: Schliessler surveys the setting.

behind bluescreens, which were meant to create a warmer color temperature."

The first planet on the characters' journey is Uriel, for which the production shot on location in New Zealand. There, Schliessler says, "Ava really wanted a strong change to the look. We decided to go with an extremely high depth of field to give the image an immediate difference from Earth. I usually try to shoot with low depth of field and control the focus to tell the story within the frame, so having everything in focus took some getting used to. Because it was exterior, I was able to shoot between f16 and f22. We also used polarizers at maximum strength to saturate skies, grassy hills, and water on a lake, but we still needed help in the DI to enhance the look."

Virtually all of the sets that were built for the different planets required what chief lighting technician Len Levine refers to as "collaborative lighting. Ava, Tobias, the art department, visual effects and production all chimed in." DuVernay routinely held what Schliessler calls "think-tank meetings, where we would gather together visual references and make it a real collaboration with the entire team." ➢

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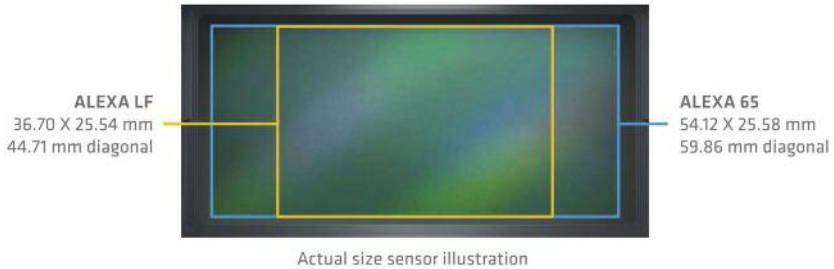

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Across the Universe

During their travels, Meg, Charles Wallace and Calvin find themselves in an unsettling environment.

Levine adds that the production also "did an immense camera, lighting, set [and] wardrobe test prior to shooting. Six different lighting looks on six sets were presented. Those were sort of a proof of concept and a general forum for the art department, visual effects, Ava and Tobias to get communication going outside the conference room."

The gaffer approached lighting the various planets' sets as though they "were basically a bunch of individual art installations," he says. Thus, the lights were largely operated remotely by lighting-console programmer and operator Joshua Thatcher, who used High End Systems' Hog 4 console and DMX Processor 8000s to control color and effects with LED-based instruments that were built into, above or just outside of the sets.

Each set had its own requirements. For the foggy planet of Orion, for instance, Schliessler needed to create a soft light that would shine through the layer of dense fog that visual effects would generate in post; to realize this, he explains, "We spanned the set with four 20-by-40 soft boxes with Arri SkyPanels, double diffused with ¼ and ½ Grid Cloth, and we used two 50K SoftSuns on scissor lifts through ¼ Grid diffusion for key light. If we needed any fill light to wrap the key, we'd bounce SkyPanels into 12-by-12 muslin frames."

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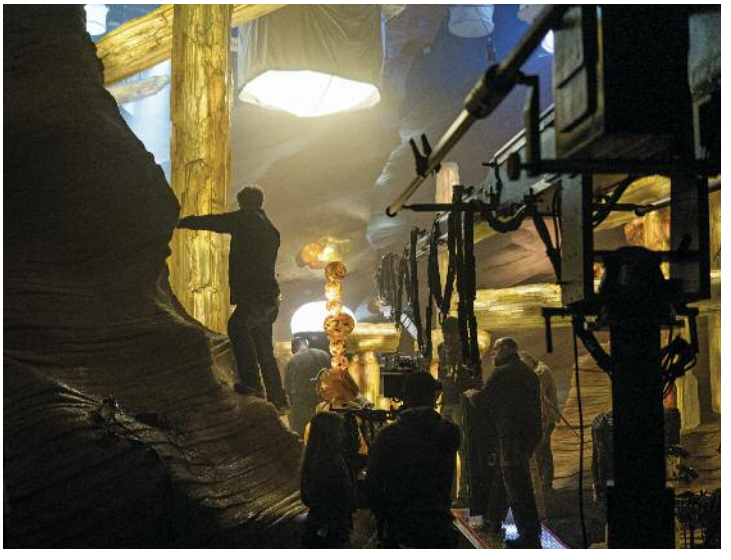

Above: Meg speaks with Mrs. Who. Right: The crew preps the cave where the Happy Medium (Zach Galifianakis, not pictured) dwells. Below: Mrs. Which guides Meg across the cave's "teeters."

Medium's cave, which serves as home to Zach Galifianakis' character and became "possibly the biggest challenge for us," says Schliessler. There, the characters were essentially limited to stepping on 1'-square "teeters" above an endless abyss. "The teeters were glowing amber," Levine explains. "They were built by the special-effects department and construction crew, and then wrapped with thousands of LED emitters by our fixture department, headed by Damon Liebowitz. They were then skinned with a translucent and slightly painted acrylic.

"There were warm sandstone walls, and we had to discuss how to light them, because we [were looking toward] the floor and into the ceiling," Levine continues. "So we used ColorBlast TRXs — which are RGBAW — hidden in the floor, for their color-changing ability and low profile. Then, from above, we used Martin Mac Quantum Washes for their quiet operation, wonderful color and super-wide beam, which was necessary because of the proximity to the walls. Almost all units from above were 'movers,' because we had no accessibility to any of the lights for pan-and-tilt control. For accents on the cave walls and backlights for the actors, we used Clay Paky Scenius units."

The question then became "how to light an ensemble elevated on teeters in a way that could be quick and yet flattering," Levine adds. Building on an idea from rigging gaffer Roger Meilink, Levine used SkyPanel S60-C lights with extra-large 12K space-light skirts, sometimes grouping a few of them together to create large soft boxes that could be moved up and down on small chain motors. "For most of our closer work, we used LiteGear LiteMats and 19-inch Jem Balls with hybrid LED ribbon inserts built by our fixtures department," Levine notes. "Joshua controlled everything on his console, parked right next to the DIT tent so that Tobias could make subtle adjustments on the fly," Levine notes.

Schliessler points out that the set

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Across the Universe

Top and above: In a scene shot on location among Northern California's redwoods, Meg and Calvin arrive in a dark, living forest. A chase scene takes place at this location as well. Right: DuVernay discusses a sequence with Reid.

also limited camera access. "Our construction coordinator, Bob Blackburn, [mitigated] that with platforms outside the set and flyable walls, which allowed cameras — on Chapman Hydrascope cranes with remote heads — to reach anywhere in the cave," the cinematographer notes.

Another planet, Camazotz, was home to a menacing disembodied brain referred to simply as "It," which threatens to take over the minds of Meg and her companions. The characters go to the proverbial heart of the evil entity in a set that was meant to look like a living construct, with electrical synapses reverberating throughout the scene. The action was shot on limited set pieces on a bluescreen stage, with visual-effects supervisor Richard McBride's visual-effects team providing fantastical embellishments in post.

On the "It's lair" set, the filmmakers wanted to generate intense lighting effects that the visual effects could later match. "We used long runs of Chroma-Q Color Force 72 LED battens," Levine explains. "They were very responsive and provided a clean, extremely bright white light. Joshua controlled the [synapse] strikes on the console."

Camazotz is also where Meg eventually finds her father, who's been trapped in a setting the filmmakers referred to simply as "father's room." Schliessler describes the set as "an endless tunnel of diminishing cubes."

Working with production designer Naomi Shohan, Levine relates, "Ava and Tobias chose colors for the backgrounds as Meg and her father interact, and we simply had [Thatcher] utilize the Road Hog 4's color wheel to change color, controlling diffused Color Force 72 LED strips [that were positioned to shine through 6-inch seams between each wall layer] to get even [colored] light on the white walls."

The "round room" set also presented unique opportunities for lighting. Built 4' off the ground, 210 degrees of the oval-shaped room was

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Across the Universe

Top: DuVernay directs Reid through a production-induced rainstorm. Middle: The crew readies the lighting for a beach exterior. Bottom: Schliessler and visual-effects supervisor Richard McBride (bottom center) examine an outdoor bluescreen set.

constructed on stage, enabling camera access (with the rest to be completed via visual effects), and its white walls were spotted with thousands of 2.5" holes arrayed in "perfect geometry," Schliessler says, to let in rays of light. "It was supposed to be like an infinite white space, but backlit evenly with hundreds of Sunray LEDs through Opal diffusion [placed] directly on the holes," the cinematographer adds. "We were able to use whatever part of the set that was not in the shot as a key light by increasing the intensity of the LED tubes without changing the color temperature. Then, when necessary, we bounced Arri SkyPanels from the key side to add contrast. It was important to maintain consistency with the depth of field [across] all lens sizes so we could keep the geometry of the set in focus; the LEDs made it easy to increase the overall light levels up to two stops to increase the depth of field for our longer lenses."

The movie's characters travel from one planet to another in an instant, "wrinkling time" by means of an artifact known as a tesseract. To illustrate the effect and show Meg traveling through fluttering "tesser ribbons," the filmmakers placed Reid on a Robomoco robotic motion-control arm on a greenscreen stage. A 1,600-watt Joker Bug was mounted on a second Robomoco arm, which was programmed to create an ultra-fast-moving lighting and shadow effect in counter-motion to the arm that was moving the actor. "For additional effect," Levine adds, "we also used Color Force 72s on the ground [and on two trusses overhead], with media playback, and Joshua added effects from his console to augment the movement and color. They shot it with the Phantom [Flex4K high-speed] camera and the Alexa."

The Robomoco motion-control system also proved crucial for a sequence in which the characters ride on the back of a flying creature that resembles a giant leaf. To capture this action, the actors were attached via

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Across the Universe

Schliessler and crew prepare their next move.

body harnesses to the Robomoco arm, and were shot against bluescreen. To emulate the look of moving sunlight for this traveling sequence, the crew employed a Mole-Richardson 1,600-watt Tener LED Fresnel that was rigged on a Chapman crane and could be dimmed up or down without affecting the color temperature.

"Matching the lighting within scenes was our biggest visual-effects challenge," says McBride. "Ava had a lot of characters to choreograph in each scene, and [there were often] at least three cameras on any given setup. The visual-effects team had to work closely with the camera team to make sure we had set data for everything we were doing. We also used witness cameras on stages and on location to help reconstruct the scenes digitally."

"Rich McBride had especially strong input into this movie visually," Schliessler says of the visual-effects supervisor. "Rich was central to making frames — probably my biggest collaboration, my second eye."

Colorist Mitch Paulson was another close collaborator, using Autodesk Lustre for the movie's final digital grade. Schliessler describes the work as being particularly "complicated," and he stresses that Paulson's work "was crucial to my cinematography."

"It was definitely the most colorful movie I have ever done," Paulson adds. "I built curves in Lustre to saturate some colors more than others while primarily leaving skin tone alone. Then we went through and built keys to control different colors more specifically — and did the opposite for the less-saturated parts of the movie. There was no global saturation being done; all the colors were individually picked and then adjusted. There were a lot of different keys going on for this one."

In one particular scene in the Happy Medium's cave, Paulson recalls, "Ava and Tobias both gave me some input on what they were looking for, and I tried something I'd done before: I keyed into the shadow area, and blurred and darkened it a little bit. It's sort of the opposite effect of a print bleach bypass, which blurs highlights — this technique blurs shadows. Everybody was happy with the results."

From the outside, *A Wrinkle in Time* looks like a significant change of pace from DuVernay's previous, smaller-budgeted features. However, the director offers, despite the productions' disparate scales, "There really isn't much of a difference at the end of the day. It's all about what's going on in front of the lens. Any romanticizing of what a big movie would be, that's great, but you can have all of that, and if you can't get what's in front of the camera, if you can't communicate your ideas effectively, it doesn't matter. That's a huge lesson to take with me at this point in my career."

Click here for a selection of lighting diagrams from the production.

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TECHNICAL SPECS

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Animal Kingdom

Cinematographer Tristan Oliver illuminates the whimsical futurescape of director Wes Anderson's stop-motion feature *Isle of Dogs*.

By Rachael K. Bosley

•|•

Set in Japan at an indeterminate point in the future, *Isle of Dogs* marks a return to stop-motion animation for writer-director Wes Anderson, whose first foray into the genre was *Fantastic Mr. Fox* (*AC* Dec. '09). For the new film, Anderson returned to London and reassembled some of the same key crew, notably director of photography Tristan Oliver. Over the course of the 87-week shoot, Oliver supervised three lighting cameramen, and at the peak of production, there were 44 units running simultaneously on stages at 3 Mills Studios.

With roots going back to Aardman's acclaimed *Wallace & Gromit* films, Oliver has been honing his craft for nearly 30 years, and his work so far includes the 2017 Academy Award nominee *Loving Vincent*, the Academy Award-winning *The Curse of the Were-Rabbit* (*AC* Oct. '05), and the widescreen 3D stop-motion feature *ParaNorman* (*AC* Sept. '12). Technically and stylistically, *Isle of Dogs* was less complex than all of those projects, but "it wasn't easy by any means," says Oliver. "Working with Wes is very different than the highly collaborative environments I've experienced on other films. He is very exacting, and the process is more reactive than proactive."

Oliver connected with *AC* via FaceTime in January to discuss the movie, which follows a pack of dogs that has been

Opposite and this page, top and above: In the stop-motion feature *Isle of Dogs*, an outbreak of canine influenza leads Mayor Kobayashi (voiced by Kunichi Nomura) to quarantine all dogs to Trash Island, where a young boy, Atari (Koyu Rankin), ventures in search of his dog, Spots (Liev Schreiber). Left: Cinematographer Tristan Oliver.

Photos by Emilie Dubois, Valérie Sadoun and Ray Lewis, courtesy of Fox Searchlight Pictures.

banished to an island of garbage following an outbreak of canine influenza.

***American Cinematographer*: This movie situates Anderson's picture-book aesthetic in an unusual environment, one that isn't immediately recognizable. How did he describe the look he was after?**

Tristan Oliver: He was looking for an aesthetic based on a lot of old Japanese movies he'd been watching. What we ended up with doesn't look like any of those, I suppose, but there's a distillation that settles somewhere in your brain. He described the setting as Japan in the near future, but the sort of future people in the 1950s would have imagined. The state of society is somewhat bizarre and alien, but most things within that society appear familiar.

Were some of those Japanese films more influential than others? Was it more Kurosawa than Ozu?

Oliver: [*Laughs.*] Definitely. Kurosawa is the most accessible, and everything else is a bit more aggressively Japanese, if you will. Wes was keen to push a *Seven Samurai* feeling with the pack of dogs. They're ropey characters coming together for a mission to do something. It's not an essentially Japanese story, but it's that kind of vibe.

Did he reference *Fantastic Mr. Fox* much when discussing what he wanted for *Isle of Dogs*?

Oliver: He was very fond of what we did on *Fox*, but this film is different in some key ways. *Fox* has a fairly simple narrative arc, and *Isle of Dogs* is infinitely more complicated; you really don't want to blink while you're watching it, or you'll miss something. And the environment is very different, so there were

Animal Kingdom

Top: The aftermath of Kobayashi's rally, which the filmmakers styled after a similar sequence in *Citizen Kane*. Above: The rally was staged in the Municipal Dome set. "The huge graphic of the mayor's head was very useful as an ambient fill source," says Oliver. "That provided back-fill, and when we turned 'round to film the audience, that motivated the light coming from the stage."

some things we did on *Fox* that just didn't work this time around. For example, Wes was fond of forcing the size of the characters down as small as possible — [on *Fox*] we'd set up a shot, and he would pull the camera farther and farther away and shrink the puppets down till we ended up with these very tiny sets and tiny characters. Sometimes they were just bits of scrap, little oblongs and triangles glued together and painted the right color, that were just skittering around in the background.

When we started *Isle of Dogs*, he was very keen on pursuing this. We had many scales: small, medium and large, and then tiny, super tiny and super tiny tiny. He'd say, 'This next shot is going to be in our super tiny tiny scale.' But once we started to play with that, it was obvious it wasn't working within the visual aesthetic of this movie. It's a very different kind of landscape, and the charm of having little characters running around in woods and fields wasn't there. We also found that although our main-character dogs worked beautifully at full size, they started to look rather puppy-ish at half size. There's a lot of character in the key dogs. So, although we had a lot of sizes made, we shot most of the movie in just one scale because it fit together much better that way.

Also, we used a huge amount of colored light in *Fox*, but on this film Wes wanted a lighting palette that was very restrictive — sort of washed out, almost monochrome. He wanted to instead use set color to create what he wanted color-wise. So, in the human world, the sets are very brightly colored, but the light is always white and nearly always quite flat. The days are all heavily overcast with almost no shadows. We used almost no key light for the exteriors; if we were keying, we were keying just slightly stronger off the fill board on one side than we were on the other. Wes recently invited me to look at the work he has done in the DI — he's been grading in New York via a remote linkup to Molinare [in London] — and he has added a lot of saturation to combat the overall monochrome feel.

How did you balance the flat lighting scheme with the need to model the puppets?

Shooting in the Municipal Dome set required significant motion-control work in order to make it look as though 3,000 people filled the seats.

Oliver: We really had to concentrate on that. With all this flat light, it was tricky to get some degree of readability and modeling into the faces without making them look too keyed or contrasty. We built a lot of special eye lights and rigged them very, very close to the lens. It's a convention in animation that human heads are slightly oversized, but these were made to human proportions, so they were about the size of the top joint of my thumb; consequently, their eyes were very small and quite far back in the head, and finding the reflection point on them was difficult.

Eye lights need to be *very* small for puppets because puppet eyes are close together and don't have the wetness of the human eye, and you often have to put in an eye light for each eyeball. We tried all kinds of things, and we finally arrived at placing Power LEDs in ping-pong balls. We got a degree of sourcey-ness out of them, but also a degree of ambient fill because of the plastic covering. Seated on top of or

Gear Spotlight: Canon EOS-1D X

The Canon EOS-1D X is the first DSLR to stand up well to the rigors of stop-motion animation, according to director of photography Tristan Oliver, who shot *Isle of Dogs* with the first iteration of the camera. "We're asking a DSLR to do something it's not built to do," he observes. "It's essentially a photojournalist's camera, and we require it to take a flawless sequence of images that are all perfectly matched and coherent. It's a big ask.

"Prior to the 1D X, our standard tool was various iterations of the [Canon] 5D, which was very susceptible to the kind of temperature changes that are common on our long shoots," Oliver continues. "While shooting with 5Ds on *ParaNorman*, for example, we'd sometimes spend half a day trying to get the cameras to the temperature they were the previous evening so there wasn't a kick in the color temp or the density — problems that are quite hard to sort out in the grading process. But on *Isle of Dogs*, whether it was a freezing-cold day or a boiling-hot night, the 1D X was solid as a rock."

Oliver was equally impressed by the quality of the data captured by the camera's full-frame 18.1-megapixel CMOS sensor. "The contrast range on the raw file is just getting better and better," he says. "Range-wise, it's as good as negative. It doesn't *look* like negative, but it does have that kind of range. That's great news for the cinematographer."

— RKB

Lights are put into position outside a portion of the animal-testing facility set.

just under the lens, they normally had enough spread to accommodate both eyes. We mounted them on the camera because they had to be as near the lens axis as possible, and if the camera was moving, we'd have them on dimmers so we could dim them as the camera moved.

What did you use for your motion-control work?

Oliver: We had to build our own rigs and do it inexpensively. We're a single-production setup, so we're not investing for the future. I brought in Justin Pentecost, who'd worked on *Under the Skin*, and he built what we needed with off-the-shelf components from China. We were able to assemble a library of modular motion-control heads, trackers and risers, all of which could be bolted together because they were made to my specs. The quality of the engineering is astonishing, and it costs just a few hundred bucks to make multiples of things. Also, because the components are substantially aluminum-based rather than steel, they're much lighter. A 3-meter tracker that would have taken six people to lift is now a two-man lift.

We used Australian software, Mantis, which Justin recommended. It's substantially cheaper than the Flair system, and [Mantis'] developer, Gerald Thompson, was on hand to rewrite the code for us. It wasn't an innately bad piece of software; it's just that Gerald thought it did what it needed to do, and it didn't do what *we* needed it to do.

Given that stop-motion is a fairly small niche, was it difficult to crew up? Did you run the trainee program you've run on past shows?

Oliver: Yes. It's very hard to get camerapeople with the necessary skill set; many are now lighting commercials or have moved on to other things. We took on more trainees than normal, and, as on *ParaNorman*, the female trainees were far and away the best of the bunch. More than half my crew was female on this job, actually. Our motion-control operator, Ayumi Ishikawa, had worked on productions in Japan, and she could also weld and run the lathe. She came in as a trainee and was promoted very quickly.

Two of my lighting cameramen, James Lewis and Malcolm Hadley, were already very experienced. I found the other one, Max Williams, through mentoring Daisy Jacobs, a student at the National Film and Television School, who had hired Max to shoot

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Animal Kingdom

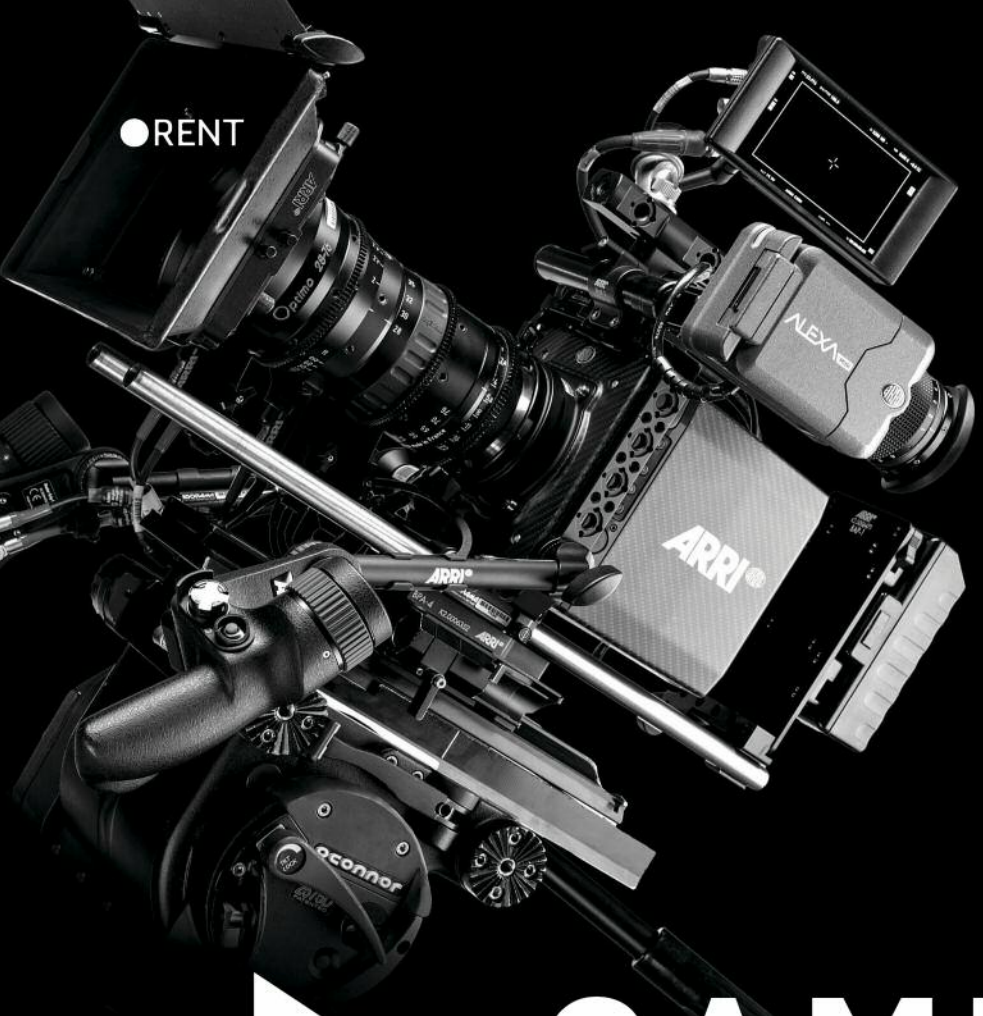
The animal-testing facility was inspired in part by the Brutalist architecture of St. Peter's Seminary in Scotland. The portion of the facility seen here is revealed at the end of a long tracking shot, and serves as the setting for a dramatic showdown. This set was used for background plates, while the character animation was shot primarily against greenscreen.

her stop-frame film [*The Bigger Picture*], which was nominated for an Academy Award. Max has a very good eye and did great work for me. I was working with first AC Mark Swaffield for the first time, and he was brilliant. Our great electrics crew, led by my regular gaffer, Toby Farrar, also featured many trainees.

How did you approach the lighting in the Municipal Dome, where the mayor stages a *Citizen Kane*-style political rally?

Oliver: We had so many shots on that set I think it ran for well over a year. It's a huge, octagonal theater with a domed roof and gorgeous red-lacquer and black-lacquer walls that were highly reflective. There were so many angles in there that it was challenging just working out where to place lights so you weren't constantly seeing them. It's meant to look as though there are 3,000 people in the audience, so we had dozens of [motion-control] passes on audience characters. The sequence starts with the camera looking up at the night sky through the glass dome, and then the camera tilts down, jibs down past gallery after gallery of applauding people, and comes to rest behind the podium. Then the mayor steps into the frame and addresses the crowd. The wall behind the mayor is a massive graphic of his face, just like in *Citizen Kane*, and that had to double as a projection screen, which meant we had a lot of lighting changes within that environment. It was quite fun in that respect.

The hundreds of tiny Japanese lanterns illuminating the set were made of cast resin and then sandblasted to give the effect of a tissue finish, and the ribs were hand-painted onto the outside. We drilled a hole in the back of those and pushed in a tiny 12-volt tungsten taillight bulb. We ran everything back to dimmers; we could dim those quite low so they glowed with warm light. The temptation is to go with



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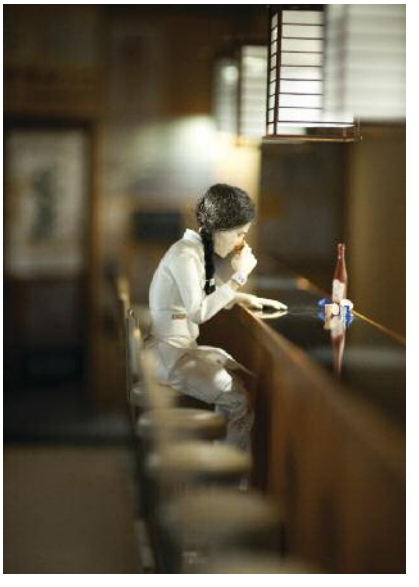
Animal Kingdom



The character Yoko Ono (voiced by Yoko Ono) is introduced in a sake bar.

LEDs on everything, but LEDs stay white no matter how much you dim them. We also had some 1-inch-long Fresnel spotlights on stands, and we did put LEDs in those. We used various other 12-volt fixtures, including down-lighters across the top of the stage.

There are a lot of people and dogs getting in each other's way on the stage, so there was a lot of shadowing going on, and I had to find ways to feed the light in. Quite often I was flying little LED strips off the front of the camera to each side just to fill in bits and pieces, to keep it as clean as possible. The huge graphic of the mayor's head was very useful as an ambient fill source; I fired a profile [ellipsoidal reflector] spotlight at it and shuttered it in so you couldn't really see where the edges were — it just became a white square. That provided back-fill, and when we turned 'round to film the audience, that motivated the light coming from the stage.

The sake bar where we meet the character Yoko Ono looks like the polar opposite in terms of scale.

Oliver: It was! That set was extremely narrow, and we had to shoot down the bar in both directions. It's meant to be a Japanese interpretation of the classic Western bar scene, where you see a glass of liquor pushed down the length of the bar toward a character. The walls at both ends of the bar flew out, as did the wall behind characters seated at the bar. I wanted it nice and moody in there. The main source is the milk Perspex behind the shelves of colored flasks behind the bar; I fired a load of cyc lights into a huge bounce board behind that wall to create super-soft light. Above Yoko are square paper lanterns, but Wes wanted to project circles of light onto the bar, not squares, so we cut down some pieces of 1/3-inch steel tubing and attached them to the Power LED in each lantern so it would

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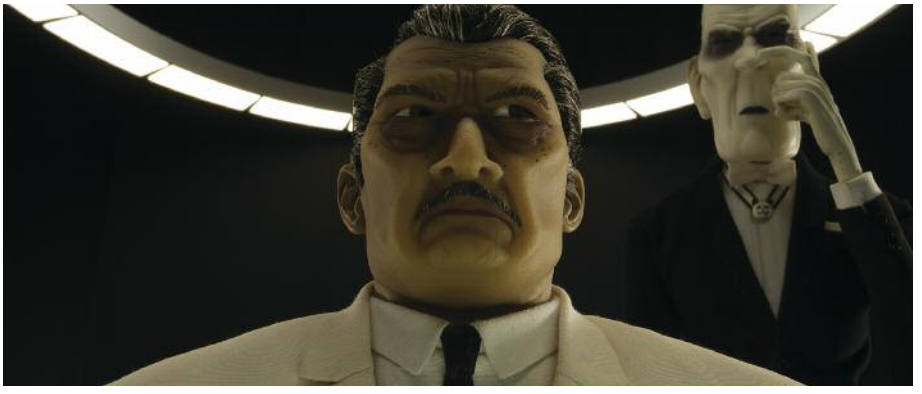
Animal Kingdom

Right: Atari searches for Spots with the aid of a four-legged friend. Below: Kobayashi, in a scene that echoes *Dr. Strangelove*. Bottom: An in-movie prop camera next to its life-size counterpart.



project a circle of light.

There's a very unusual shot in that set, an extreme close-up of Yoko and Tracy, an American exchange student, as they sit at the bar and look through a book of documents. The shot starts as a very tight two-shot, and then the camera pushes in slightly as the girls bring their heads together over the book. Wes wanted to reference the shot in *The Color of Money* where Tom Cruise leans down over the pool table with his cue and the table rises up to meet him. We couldn't move the bar because it was only 2 inches wide, and moving it even slightly threw everything out of kilter. So we sawed out the wall behind the girls and mounted it on motion-control risers, and as their heads come together, the wall behind them jacks up.

We actually had quite a lot of motion-control in that set. There's another shot that tracks the entire length of the bar and finds a frame-filling close-up at the end. I was having trouble making that work, and Stuart Galloway, our head of motion-control, built a tracker rig we placed way outside the set with a long Ubangi on it, and a little idler wheel came down off it and rested on a tiny track hidden behind the bar, just to bear the weight of the camera. We used a 24mm macro Sigma lens because it was the only one we could rack far enough to get a close-up of this character and the wide of the bar at the other end.

The long tracking shot in the laboratory adjacent to the sake bar involves a lot of lighting effects. How did you approach that?

Oliver: That set was about 30 feet long, and it was absolutely covered in LED practicals that were all on individual channels running back to dimmers. There are gauges, flashing lights, and also a large tube built off the back of the set that pulses with light. As the chief scientist walks along and stops to confer with other scientists at various points, some extraordinary thing happens at each stop — something spins and lights up or explodes. Wes loves to tinker with the timing on stuff, and he preferred to work off site, so we captured 16 iterations of every frame in

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Animal Kingdom

Left, top and bottom: An animator works through the sequence in which Atari arrives on Trash Island and befriends a pack of dogs. Above: Oliver and gaffer Toby Farrar examine tiny practical lights.

that sequence to give him all the options he wanted for the lighting effects. So, whereas the animator would typically press the button, capture the frame and then move on to animate the next frame, in this case the animator would press the button, the camera would fire, and then the lights would change and the animator would capture the other 15 options [for that same frame]. After viewing all the options, Wes would decide what flash rate or explosion point he wanted.

That process sounds like it would lengthen your schedule, but 87 weeks is fairly typical for a stop-motion feature, isn't it?

Oliver: Yes. It did take longer to set up all the iterations, and the animator had several minutes of wait time, but this film is less cutty than a lot of movies. Several shots run over a minute. *ParaNorman* took about 85 weeks, and this film has two-thirds of the shots that film had. We were generating a vast amount of data on the set, and Wes was on top of it all. After shooting two films for him, I've come to understand that viewing material on a flat screen, removed from the geography and logistics of the set, is somehow essential to his process.

How did you ensure consistency across all the monitoring devices?

Oliver: We shot with the Canon [EOS] 1D X [see sidebar, page 54], and [visual-effects supervisor] Lev Kolobov built a LUT for us that worked on the floor, in our projection area, and in the DI. On the floor, we mostly worked to calibrated Eizo flat-screen monitors. Wes worked with a large iMac at home.

How did you arrive at the look of the animal-testing facility where the climactic action occurs?

Oliver: I sent Wes some of Christopher Payne's photos of North Brother Island [from *North Brother Island: The Last Unknown Place in New York City*], the site of an old tuberculosis hospital that's now totally overgrown with vines, and some photos of St. Peter's Seminary in Scotland, a masterpiece of Brutalist concrete architecture that was built in the 1960s and is now also totally overgrown. Wes liked these references, so that's what we worked towards.

The sequence begins with a shot of our hero pack of dogs, and once the boy steps into frame, the camera starts moving and reveals the rest of the facility with a tracking shot that lasts about 50 seconds. Each room is bigger than

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Animal Kingdom

Top: Scientists confer in the laboratory adjacent to the sake bar. Middle: Scientists meet with the mayor. Bottom: This theater set incorporates miniature Japanese lanterns, which "were made of cast resin and then sandblasted to give the effect of a tissue finish," Oliver explains.

the last and filled with more dogs, and the shot ends in the space where a showdown takes place. The tracking shot involved a variety of scales, so we had to rescale the camera move and the distance from the set in order to create a final shot that would have one coherent size.

I used very large soft sources throughout this set, and for the space where the showdown occurs, I was also able to create atmosphere with some smoke because there's no animation in the set — it's a beautiful miniature we used to create a set of background plates to lay in behind the action. It was about 4 feet wide, 4 feet tall and 8 feet long, and we photographed the hell out of it with every lens at every height. We shot it with and without smoke just to give it some proper depth. I lit it very simply with big bounced soft sources at left and at right, slightly brighter on the right, and also had soft light coming through a glazed panel in the roof. I aimed a profile spotlight straight down at the area of the floor where the action would take place, and I stuck a few LED strips under the platform visible at the back of the space just to lift the darkness away a bit.

The [showdown] action was, for the most part, shot against greenscreen using the full-size dogs — although we did have some scaled-up floor planes made to give the right kind of shadow and fill detail on the dogs. I created large versions of the [set's] windows by cutting holes in 8-by-4 sheets of beadboard, covering them in Hi Lite diffusion, and then rigging them in a kind of tented-roof shape over the floor. We lit with a combination of [Quartzcolor] Iris 1 cyc lights directly through the holes and 650-watt Arri tungsten Fresnels bounced off more beadboard to match the look of the miniature. ➢

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Animal Kingdom

American exchange student Tracy (Greta Gerwig) organizes a resistance to Mayor Kobayashi's machinations.

Apart from the Sigma macro lens, did you source anything unusual for your lens kit?

Oliver: We mostly used old Nikon manual prime lenses with a Leitax adapter hard-mounted on the back of the lens. We needed about 150 of them, and Grays of Westminster got us the lot in very short measure. We had a fairly catholic selection of focal lengths, but our default lens was the 20mm, and we shot most of our close-ups with the 28mm. We had a few 16mm fisheye lenses because Wes was very struck with the look of *Seconds*

[shot by James Wong Howe, ASC; *AC* Nov. '97], and he wanted some shots to look like that. The 16mm has very bad minimum focus, so we had some of them shimmed out. But compositionally, we weren't making the most of it, because in order for that lens to look as bendy as possible, you need a diagonal of receding size in the frame. Wes wants symmetrical compositions, so we were only seeing the distortion in the set at the edges of the frame. Eventually, he found a way of working with that.

He also wanted to do some zooms, so we had some really good, lightweight Canon cine zooms, the [CN-E] 15.5-47mm and 30-105mm [both T2.8], which we had adapted to cover our full-frame sensor. Of course, we were immediately compromised in terms of depth of field, and Wes wanted crisp depth of field while zooming. With Wes, there's always a conflict with Newton. [*Laughs.*]

We arrived at a solution that we applied to zooms and even occasionally to shots we made with primes: we broke the shot into planes and shot each plane separately. For example, if we were filming a dog close with other dogs behind, we'd shoot the close-up with greenscreen and then refocus on the mid-ground and shoot the rest of the shot to get both a sharp mid-ground and a sharp foreground. Because the dogs were hairy and getting a key off the green was so difficult, every close-up involved shooting a frame with greenscreen and a frame without; we had greenscreens on rails that could be pulled in and out like curtains. That way the visual-effects team could extract the hair detail from the non-greenscreen frame and then use the greenscreen as a match to sort of soft-edge it back into the image.

How do those look comped together?

Oliver: Your eye senses something strange, but you're not quite sure what it is. However, I'm sure that won't detract from people's pleasure in watching the movie. *Isle of Dogs* is an absolute distillation of Wes Anderson. If you like his movies, you will love this one. ●

TECHNICAL SPECS

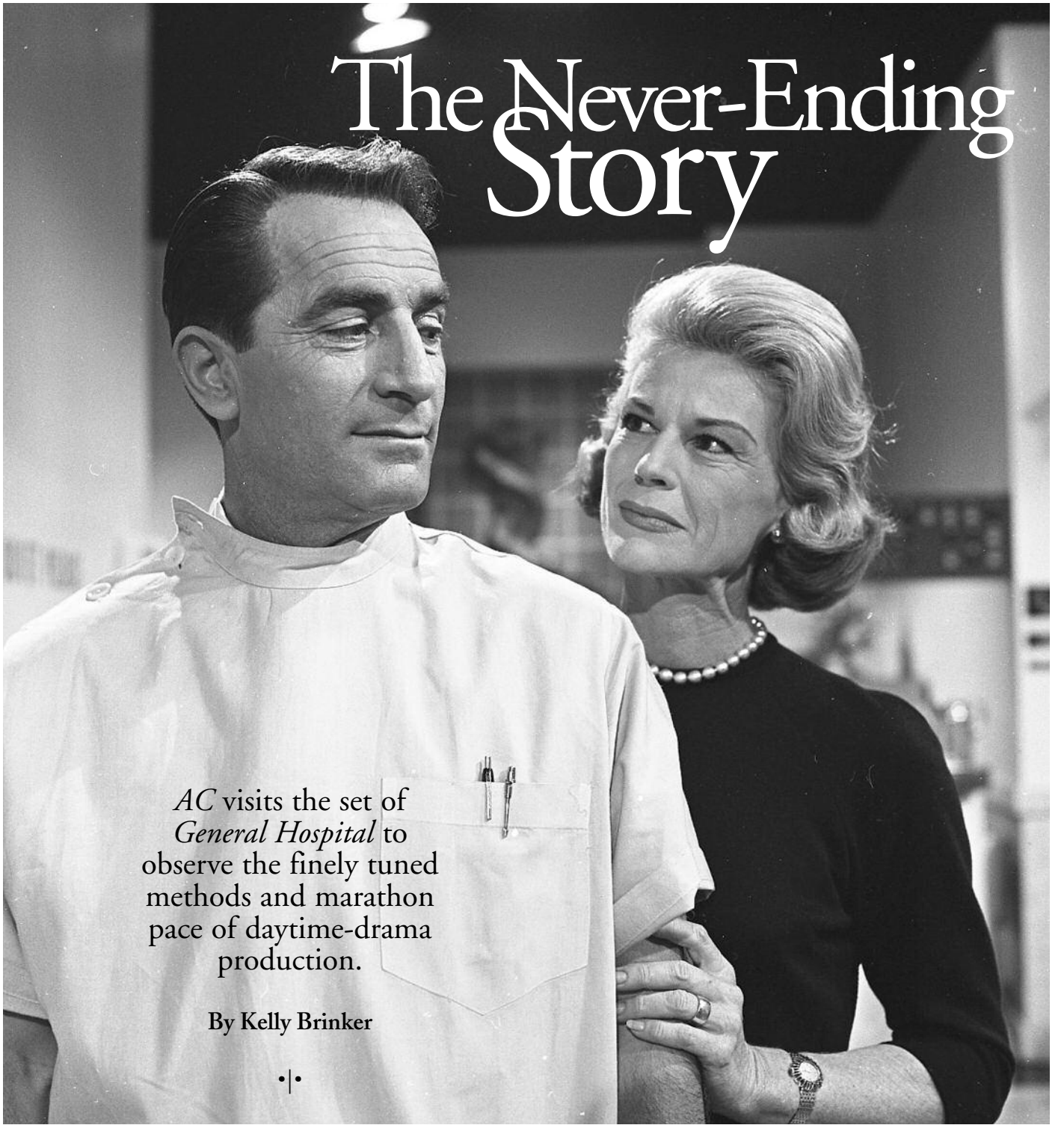
2.39:1

Digital Capture

Canon EOS-1D X

Nikon, Canon, Sigma

The Never-Ending Story



AC visits the set of *General Hospital* to observe the finely tuned methods and marathon pace of daytime-drama production.

By Kelly Brinker

•|•

The camera focuses on a computer screen as "Henrik Faison" is typed into the "Spyder-Finder" search bar. No results appear. Cut to Anna Devane (Finola Hughes) sitting on the couch in her dark living room. Her face is illuminated by the glow of her laptop. Cut to a wider, elevated angle that reveals the fire burning in her fireplace as she reaches to grab her glass of red wine from the coffee table. The camera slowly zooms in, right before a cut to a closer shot of Anna as she sips her wine. The camera zooms in further. She is deep in thought when interrupted by the sound of her daughter.

"Mom?" Robin Scorpio-Drake (Kimberly

McCullough) calls out. Cut to Robin entering the room.

"Oh, my God — Robin!" Anna exclaims. Cut back to Anna as she sets down her glass of wine and her laptop. The camera tracks her rising from the couch to embrace her daughter.

"What are you doing sitting all alone in the dark?" Robin asks. Cut to Robin's expression as she embraces her mother. Cut to Anna's expression during the embrace.

"Cut!" It is the voice of director William Ludel, speaking over the P.A. system from the control booth on the set of the longest-running American daytime drama currently on television, *General Hospital* — the set of which *AC* has been invited to visit. We watch as stage managers rush to give the actors direction imparted to them by Ludel through their headsets. The crew quickly resets all equipment to the top marks. Like a well-choreographed dance, all players return to their starting positions to record the scene's second and final take.

There is a two-monitor display to the left of the set. The top monitor shows the "director's cut," which displays the scene as it would appear to an audience, while the bottom monitor is a split-screen showing the feed from all four cameras. This is where we meet producer Mercer Barrows, who serves as our behind-the-scenes tour guide for the episodic production shot at the Prospect Studios in Los Angeles.

The previous incarnation of this particular stage once housed such classic shows as *American Bandstand*, *The Lawrence Welk Show*, *Let's Make a Deal* and *Family Feud*, and served as home base for the 1984 Summer Olympics in Los Angeles. It was torn down and replaced in 1989 with a structure designed specifically for *General Hospital*. Prospect Studios is the original home of the production, though through the years it cycled to Desilu Studios (now Red Studios Hollywood), followed by Sunset Gower Studios, before returning.

General Hospital first aired on ABC on April 1, 1963. The story focused on Dr. Steve Hardy (John Beradino), chief of internal medicine, and Nurse Jessie Brewer (Emily McLaughlin) as their daily lives played out on the seventh floor of the hospital.

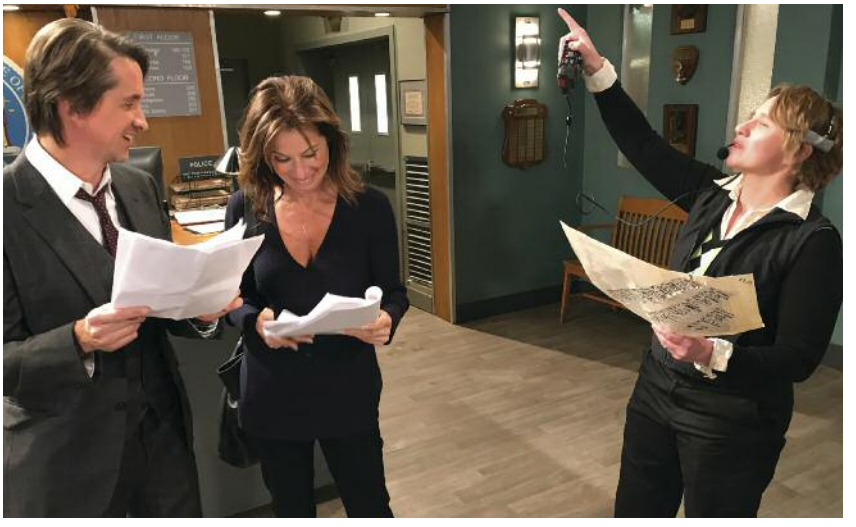
Created by Frank and Doris Hursley, *General Hospital* was the first daytime medical drama shot on the West Coast, with an original half-hour runtime that expanded to 45 minutes in 1976 and eventually to 60 minutes by 1978. The show airs five episodes a week, 52 weeks a year, and they recorded their 14,000th episode this past February.

"When I started on the show in 1979, I worked in the art department," Barrows says. "We would shoot one episode a day. Each night, we would

Opposite: On April 1, 1963, the world was introduced to Dr. Steve Hardy (John Beradino) and fiancée Peggy Mercer (K.T. Stevens) when the daytime drama *General Hospital* premiered on ABC. This page, top: In February 2018, cast and crew celebrated the shooting of the 14,000th episode of the longest-running American soap opera currently on television. Above, from left: James Patrick Stuart (who plays Valentin Cassadine), Chloe Lanier (Nelle Benson), executive producer Frank Valentini, and Finola Hughes (Anna Devane) pose on stage during the celebration.

Behind-the-scenes photography by XJ Johnson and Howard Wise, courtesy of jpistudios.com. Additional photography by Erik Hein, Matt Petit and Todd Wawrychuk, courtesy of American Broadcasting Companies Inc. and ABC Photo Archives.

The Never-Ending Story



From left: Actors Michael Easton (portraying Dr. Hamilton Finn) and Nancy Lee Grahn (Alexis Davis) check their scripts between scenes while lighting director Melanie Mohr gives instructions to the lighting controller through her headset.

prep the stage for the next day, setting up for different scenes and different sets. Now, for cost reasons, we try to complete blocks of scenes without changing the sets. So at the end of each day, we have completed multiple parts of up to three or four episodes."

To keep up with this type of shooting schedule, there is an extensive amount of planning that goes into each production day, and it is executive producer Frank Valentini who keeps it all running smoothly. "My position is all-encompassing," Valentini says. "I oversee all of the directors, the look of the show, the casting of the show, and the writing. As the showrunner, I am also in charge of the budget and figuring out how we are going to execute each episode. It is pretty intense, but a lot of fun."

He further notes that the show's three lighting directors — Melanie Mohr, Vincent Steib and Bob Bessoir — in large part serve as the production's cinematographers. To help explain the amount of preparation involved in the daily production schedule, Mohr breaks down the lighting process:

"If I am scheduled to be the lighting director on Thursday, I will report to the studio at 10 a.m. on Wednesday for the Thursday production meeting. The meeting is about an hour long and includes executive producer Frank Valentini, the director or directors scheduled for that day, the booth producer for the day, the art department, the writer, hair and makeup, the prop master, the financial department, production manager Tom Rotolo, and myself — the lighting director. We will go through every single scene scheduled for that day, and talk about whether the scenes are day or night, who is in the scenes, what the feel of the scenes are, which cameras are going to be used, and if they are going to use a high camera or a low camera. I will talk with the director, producer and art department directly. I will look at the blueprint of each set and go through it with the director to find out what the action is, where people are going to stand, and where the cameras are going to be. I'll put all that in my head and then go home to take a nap, before returning at midnight to join the night lighting crew.

"At midnight, we hit the ground running and start lighting all the scheduled sets," she continues. "I go through every set, look at the blueprints and the blocking from each director, and I instruct the crew about where to put every light and what gels to use. Then we will move to the next set and do it all

Gear Spotlight: Litepanels LED Panels

Melanie Mohr started off her career on *General Hospital* as a stagehand in 2005, with a background in theatrical lighting design. She worked her way up to the position of head electrician — and in January 2016, she became one of three lighting directors on the show.

During *AC*'s set visit, we asked Mohr to identify a piece of equipment she feels is indispensible for keeping pace with the soap opera's shooting schedule. "My most valuable asset is my crew," she says. "We move at a very fast pace, shooting up to 140 pages a day, and it is really important to be surrounded by people who are reliable, think fast and act fast. We have to improvise a lot on the spot, so a crew that can do that, and do it well, is invaluable.

"But if you want an actual piece of lighting equipment that has greatly reduced time cost and the nuisance of running cables, that would be the LED panels by Litepanels," Mohr continues. "We use 12-by-12s that are battery-operated and handheld — so when a director comes up with a new idea for a shot that we are not currently lit for, we can run in with an LED light panel, put some light on an actor or piece of set, and then continue on with the scene without us having to grab a ladder and rig a new light. The light panels are a really quick, run-in-and-save-the-day kind of instrument, and without these we wouldn't be able to complete the days, lighting-wise.

"This also speaks to the crew, because they have to run in and stand there with the light panel while the lighting director talks them through the angle and height of where to direct the light. [The lighting directors] have the advantage, because we can see the monitors in the booth, while [the crew] cannot see them on stage. It is important to have a crew that has the right knowledge and instincts to know where to stand on set, and on which side of the cameras."

— KB

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The Never-Ending Story

Right: Sitting on the couch in her townhouse, Anna catches up with her daughter, Dr. Robin Scorpio-Drake (Kimberly McCullough), who is in town for a funeral. Below: In 1985, Robert Scorpio (Tristan Rogers, right) learns from his ex-wife, Anna, that Robin is his daughter.

over again until all the sets are done."

The nurses' station is the only permanent set on stage. There is an estimated total of 200 sets that rotate in and out of the stage's remaining space. Depending on the scenes planned, the number of sets prepared for a single day of shooting range from two or three to 12 or 13.

Three days a week, construction crews come in at night, along with the electrical crew. Some of the sets, like Kelly's Diner and the Quartermaine mansion, have been a part of the show for decades — and have been built to be reassembled quickly — while others are created for limited-time use. The latter tend to incorporate materials repurposed from previous sets, and might only stick around long enough to complete a storyline. The location of each set is arranged to maximize stage space. Sets are sometimes built in a condensed version. "Shooting order is determined by degree of difficulty of scenes and cast requirements," Barrows notes.

For each set, "the head electrician draws a lighting plot as instructed and designed by the lighting director of the day," Steib says. This plot notes the channel of each fixture, and is later referenced during recording. There are no permanent lighting designs for the individual sets because they are continuously placed in different areas on the stage and are subject to varying story-based requirements.

"All standard rotating sets have a basic 'look,'" Bessoir says, "but that can change [based on] the type of story we are telling — time of day, dramatic situation, or camera or actor movement. If [the script calls for a] blackout on the show — or a fire! — the source will change."

Since the job requires a 20-hour workday, the lighting directors rotate, but they do communicate with each other when necessary.

"Communication between the lighting directors is important for continuity, especially when we are establishing a new set," Mohr says. "The lighting and colors on a set can look vastly different in person than they do on camera, and since we set up the lights hours before the cameras are brought in, it is important that we communicate with each other in regard to what we tried out, so together we can produce the right look and feel for a set."

When Mohr has the opportunity to establish a set, she uses her background in theatrical lighting as her main inspiration. Her love of horror, science fiction and silent films influence her lighting designs as well. "I borrow a lot of lighting looks from *The X-Files*," Mohr relates. "When we had to light the set of

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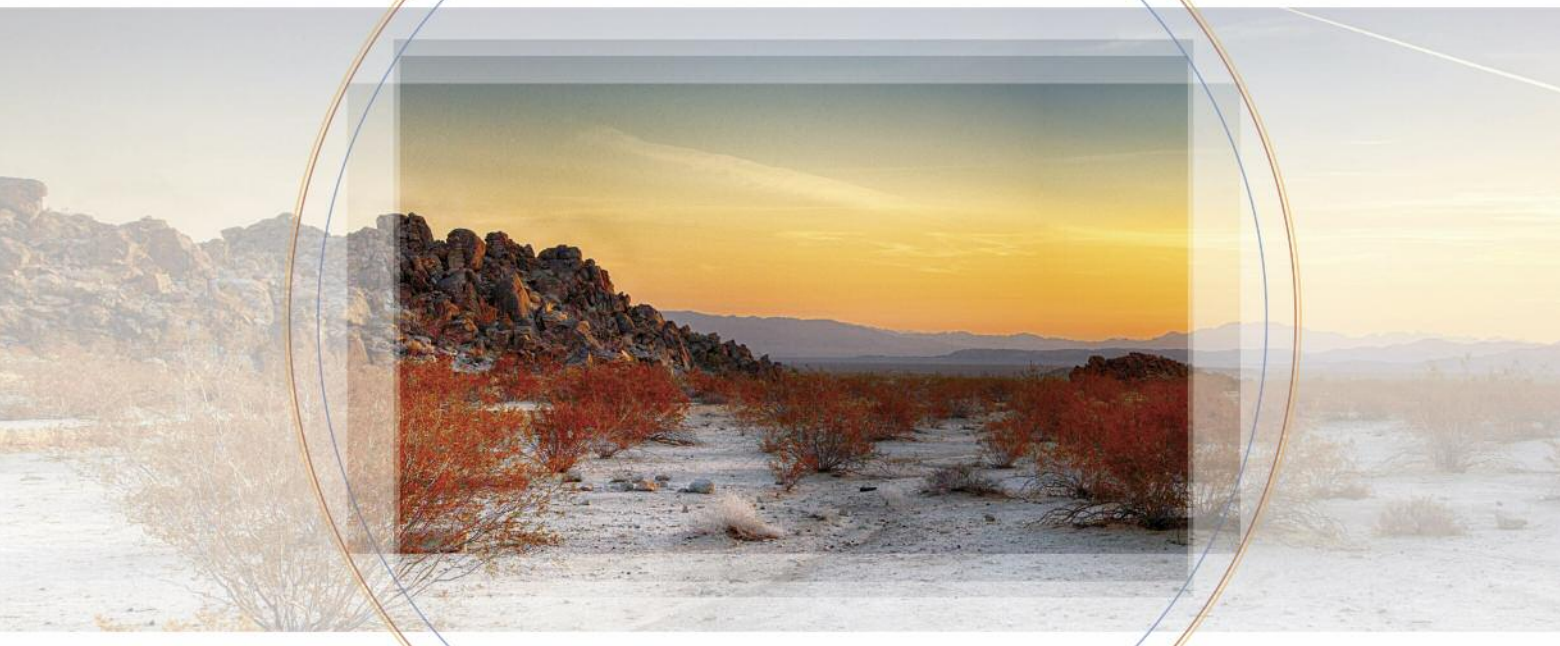

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The Never-Ending Story

Right: Camera operator Barbara Langdon lines up a shot behind Emme Rylan (portraying Lulu Falconeri). Below: Camera operator Craig Camou focuses on Steve Burton (portraying Jason Morgan) while maneuvering the camera just underneath Mole-Richardson 2K Fresnels.

an old boiler room in the hospital basement about a year ago, I established it to look like something you would see on that show."

Mohr also established Anna's townhouse. Bardwell & McAlister 2K Fresnels are typically rigged high above this set, while Mole-Richardson 2K Fresnels are hung lower to serve as "eye lights, but we also call them hangers or front lights," she notes. "The Mole-Richardson lights give out the same amount of illumination as the Bardwell & McAlister 'green-head' lights, but they are smaller in size so it gives the cameras and boom operators a little more room to maneuver."

Bessoir adds, "We use 1/2 diffusion wraps and modifiers, plus the usual corrective colors. We also use 24-by-32 Chimera Quartz Plus soft banks, in addition to a selection of 'soft lights' from 1K to 4K. Theatrical gels are used as well."

Mohr employs ellipsoidals to simulate window light on the townhouse set. A gas fireplace is installed and run by special effects, and practical lamps are placed by the art department. All lights are run through dimmers, and controlled via DMX with an ETC console by daytime lighting-board operator Peter Canon in a small room located on the fourth floor. There are more than 1,000 60-amp and 20-amp dimmers on the stage.

"The night crews leave at around 8 a.m., and at 8:30 we go on camera," Mohr says. "The daytime electric crew is now on stage and I take my place inside the production booth. I watch every scene and adjust the light levels accordingly until we wrap for that day. It could be 5 p.m. or it could be 9 p.m. It depends on how many pages are planned for that day."

On the day of our visit, production has prepared for a 118-page workday and Bessoir is the day's lighting director. The scenes we observe are for episode 13,977. Anna's townhouse is the first set scheduled. Cameras 1, 3 and 4 — Ikegami HDK-79Ds operated by Barbara Langdon, Craig Camou and Dean Cosanella, respectively — are mounted to pedestals and fitted with Fujinon 6.5-180mm broadcast lenses. Dale Carlson operates camera 2, an

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The Never-Ending Story

Top: A clipboard on the camera contains shot notes for camera operator Dale Carlson, who's framing a rehearsal with William deVry (portraying Julian Jerome) for a live episode that aired in May 2015. Below: Camera operator Dean Cosanella lines up his shot for a scene in the Port Charles Police Department set.

Ikegami fitted with a Fujinon 4.5-59mm wide-angle zoom and placed on a Vinten Merlin compact pedestal-mounted jib arm, which requires only one operator. "Dale Carlson is the only member of our camera crew who has the ability to use this difficult piece of equipment," Barrows says. Steib adds that the crew is also ready with "a handheld, and/or a handheld on sticks."

"We have a constant challenge with lighting a multiple-camera drama series," Bessoir says. The task, he explains, is to "create a rich dramatic environment [while lighting] for many camera angles at once, avoiding problems with live audio gathering, and [shooting] flattering but dramatic close-ups — at a breakneck pace."

Video operator Tony Simone notes, "At the start of each day, I move all the cameras to the nurses' station for chipping and calibration." As the only permanent set, the nurses' station "has the brightest light, [so it is used for] gray cards to ensure all cameras have the same white balance."

Simone controls the camera settings from a console that contains the Ikegami operation control panels (OCPs) for each camera. The console is located in a curtained-off space near the main recording server. With the OCPs, Simone can color correct the image on the fly, and add an ND1 filter for skin tones when needed.

"The cameras have a Black Net and a Soft/FX filter in the filter wheel behind the lens," Steib says. "Normally the show uses the Black Net, but that can be changed as needed." The cameras are set to shoot 720p at 59.94 fps and record to Avid DNxHD 145. "We rate the cameras at 340 ASA, and we shoot at a -3dB gain at approximately 20 to 25 footcandles, with a stop ranging from f2.2 to f2.4," he says.

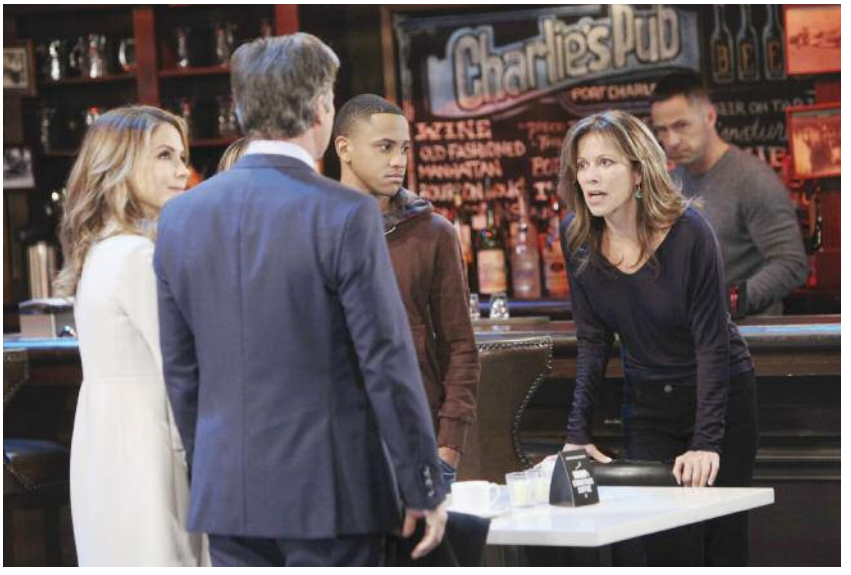
Bessoir adds, "We try to keep a narrow depth of focus to blur our sets and give a nice close-up look, but we also need enough depth to make focus accurately and fast."

Clipboards are placed on each camera, with notes containing shot numbers followed by specific directions for the camera operator. Each operator has a different set of notes based on the placement of their specific camera. "They start with number one on the first page of the script," Langdon says. "Whether or not each shot is coordinated with dialogue or action is decided by the director."

"On other soap operas like *Days of Our Lives* and *The Young and the Restless*, every scene will start on shot number one," Cosanella adds. "*General Hospital* is the only one that I know of that numbers them [based on the full script]."

"We have pencils ready so we can write down any modifications or new adds given to us by the associate director," Langdon continues. "We do

The Never-Ending Story



Top: Alexis faces her opponent for the mayoral race, Ned Quartermaine (Wally Kurth, second from left) inside Charlie's Pub. Bottom: Carlson operates the Vinten Merlin compact jib on the PCPD set.

have a lot of input as to whether a shot is going to work or not. For example, with [Anna's townhouse] today, there is one wall off, and a whole second wing of the original set is missing. This setup might not be what they had in mind when it was blocked, so we have to speak up and move some equipment or props to get a better angle to make the shot work."

Both operators prefer the current fast-paced shooting environment. Cosanella started working on soap operas in 1988 for NBC on the show *Santa Barbara*. Langdon began her career in 1982, shooting professional sports, and switched to soap operas in 1994 during the baseball strike — starting off on the show *Another World*.

"I don't want to go back to the days where it took forever to shoot one scene," Cosanella attests. "It is exhausting shooting the same thing over and over again."

"We have to get through 140 pages a day," Langdon adds. "We don't really have much downtime, so your energy is up from the start. We shoot a scene once or twice, three times at most, and then we move on to the next one."

This fast-paced production schedule helps keep costs down and the show on the air. In the late '70s when *General Hospital* was on the brink of cancellation, Gloria Monty was hired as executive producer and given a short timeframe to turn the show around — or the world would have said goodbye to the citizens of Port Charles, N.Y. Monty immediately changed the pacing of the program by eliminating the long, drawn-out pauses, and more than doubled the number of scenes per episode. She also redesigned the sets, costumes and storylines to capture the attention of a more youthful, collegiate audience.

On November 16 and 17, 1981, 30 million Americans tuned in to see the wedding of Luke and Laura Spencer (Anthony Geary and Genie Francis, respectively) — which remains the most-watched television event in American soap-opera history. The nuptials took place at the home of Port Charles Mayor John Everett (James Mendenhall), who also officiated the ceremony. The event was shot on location at a home in the Fremont Place gated community located in the Hancock Park area of Los Angeles.

"I was an electrician for the wedding remote, and Thomas Markle was the lighting director," Steib says. "At the time, they were shooting with Ikegami HL-79A tube cameras. With tube cameras, you had to be really careful not to aim them toward the sun so the tubes wouldn't burn out. I believe we had four cameras that had triax cable, [which] went back to a video village where each camera had its own tape machine.

"We used 12K and 6K HMIs, and a lot of shiny boards," he continues. "It felt like we were using miles and miles of cable for this remote. We had 15 electricians working without any meal breaks. When the cast would break for a meal, we had to pre-set the next scene, so we would just grab something while pulling out the cable. Each scene was finished in a couple of takes,

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The Never-Ending Story

Top, from left: Associate director Teresa Cicala, director William Ludel, technical director Chuck Abate and lighting director Bob Bessoir work at a fast pace inside the production control booth. Above: *AC* photo editor Kelly Brinker (second from right, wearing black) grills Ludel and producer Mary-Kelly Weir (right) between scenes.

and then we were right back to setting up the next scene."

Shooting on location occurred quite frequently during the 1980s. "I think we maybe did four location shoots a year, and a bunch of mini-shoots," recalls Hughes, who started on the show in 1985. "We would be out of the studio, out in the open, driving cars and jumping off cliffs, making it look as real as we could." She explains that Monty was a "real visionary who was amazingly in touch with human emotion, and she wanted everything to come from a real place. Even though we might be doing outlandish stories, everything had to be rooted in a real emotion and be very human."

Some of the locations included Catalina Island, Santa Barbara, Big Bear Lake, Mexico, Texas and Mount Rushmore. "The show had a lot of money back then," Steib says, "so if there was something that Gloria wanted to do with the production, they let her do it."

Actor David Mendenhall, who portrayed Mike Webber, started on the show in 1980 when he was 8 years old. He began as a day player hired by Monty, but his role expanded when his character was adopted by Rick and Lesley Webber (Chris Robinson and Denise Alexander, respectively) — Laura's parents. He appeared regularly in two to three episodes a week for six-and-a-half years.

"Some tape days were different than others," Mendenhall recalls. "Some days were called 'block and tape,' where we would get our blocking from the director and tape immediately afterward. We would start in the morning and shoot until we were done. However, most days were what we called 'rehearse and tape.' When we taped shows that way, we would block and rehearse in the mornings. After rehearsals ended, all the actors would be called in to receive notes from the director and Gloria for the scenes we worked on together. We would start taping those scenes in the afternoon."

McCullough started on the show in 1985 at the age of 7, with Robin immediately set up as an integral part of the storyline, which was unusual for child actors working on soaps. McCullough worked five days a week with 40-50 pages of dialogue a day, while attending studio school on set, along with Mendenhall.

"Gloria liked to work a scene to death," McCullough says. "Even though she was the executive producer, she acted more like a director. She had me audition for the role 12 times, and the last three times were improv screen tests to make sure I could improv with Finola Hughes and Tristan Rogers (portraying Robert Scorpio), who played my parents. There was a lot of trying to make it seem like real life, and the scenes felt really natural because we worked the hell out of them. It is very different than it is today, because we had long hours. We would get there at about 6 a.m. and some actors would still be taping until midnight or 1 or 2 in the morning every day."

These days, the workday for the actor depends on when their scenes are scheduled for recording. McCullough

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The Never-Ending Story

Former executive producer Gloria Monty (center) works through a scene with Rogers and Anthony Geary (portraying Luke Spencer) on location on June 13, 1981.

and Hughes note that they often arrive at the studio around 6-6:30 a.m. so they can get through hair and makeup and not have to rush before rehearsal, "unless you are first up, and then you are rushing," Hughes says.

"The scripts are sent out digitally about a week in advance," Hughes says. "I read the script as soon as I get it, so if there is something that jumps out to me in a speech or in the dialogue, I will email the producer to see if we can play around with it a little, and they will send me revised pages about a day or two before shooting."

Once on set, we learn there was a quick rehearsal and blocking with the actors and director at around 7:15 a.m. Per usual, the director then headed to the control booth, where he joined Bessoir, producer Mary-Kelly Weir, production associate Jillian Dedote, associate director Teresa Cicala and technical director Chuck Abate. They now sit facing a wall of monitors. Similar to the monitors on set, the larger one displays the feed with cuts, while the smaller ones are linked to each camera on set.

They start with a technical rehearsal. The production associate monitors the script and keeps track of the overall timing. The associate director gives shot numbers to the camera operators through the headset. Ludel snaps his finger and says the camera number he wants to cut to, and the technical director makes those cuts from the switcher.

In the far-right corner of the room, Bessoir keeps an eye on the light-

ing. Upon noticing a glare on a picture frame on Anna's fireplace, he instructs the crew to make an adjustment. He also refers to the lighting plot, and tells Canon — via headset — which channel to adjust, and how much light needs to be reduced, to help eliminate the glare. He also notices a shadow coming from either the boom or the Merlin. He calls for additional adjustments from the crew until the shadow disappears.

The technical rehearsal ends and they start from the top, recording a single take. Everyone looks to Weir for approval. "Looks good," she says. "Moving on."

The crew sets up for the next scene, the actors check their scripts, and Ludel quickly runs to set to speak with the actors. When he returns to the booth, the process starts over again. This continues until all scheduled scenes are recorded.

The associate director who was in the booth for that episode will complete the first editing pass with Avid Media Composer, after which postproduction supervisor Peter Fillmore takes over. Fillmore reviews all footage to ensure the best possible cut. He completes the final cut with Valentini before it goes to sound effects, music and coloring. Colorist Stephen Kuns performs final color correction using Blackmagic Design DaVinci Resolve. All deliverables are output to 720p and 59.94 fps, and given to the network where closed captioning is added.

"There are so many wonderful dramas on the air — *Grey's Anatomy*, for example — that have borrowed from soap themes," McCullough says. "I just have so much respect for Frank Valentini and for how he runs his show, because nobody is putting out that type of quality in that amount of time with that amount of money."

Valentini adds, "People who don't watch [daytime dramas] are often quick to dismiss them, but I am so proud of everything we do here. We have an incredible team made up of very dedicated individuals. So many have been with the show for a very long time, and they really love what they are doing and are excited about it and care about it and come in every day prepared. It really is like a family."

For additional coverage — including interviews with McCullough and Hughes about their work as directors, and more tales from Vincent Steib — visit www.ascmag.com. ●

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Seduce and Destroy

Jo Willems, ASC, SBC and director Francis Lawrence weave a web of intrigue with the modern-day spy thriller *Red Sparrow*.

By Matt Mulcahey

•|•

Red Sparrow begins with an ending. In an ornate opera palace, the performance of Russian ballerina Dominika Egorova (Jennifer Lawrence) comes to an abrupt and dramatic conclusion when her partner lands awkwardly, shattering both Dominika's leg and her promising stage career. It's the inciting incident that propels Dominika into the world of contemporary Cold War espionage. She reluctantly enrolls at "Sparrow School," a training facility where Russian agents are taught the art of seduction and manipulation. Her first assignment out of school: cozy up to CIA agent Nate Nash (Joel Edgerton) in order to discover the identity of a mole operating in the upper reaches of Russian intelligence.

Opposite: Dominika Egorova (Jennifer Lawrence) is pressed into service as a Russian intelligence operative in the feature *Red Sparrow*. This page, top: Dominika is sent to "Sparrow School" to learn the finer points of tradecraft. Above: Cinematographer Jo Willems, ASC, SBC (standing at right), director Francis Lawrence (center) and camera operator Dave Thompson prepare to shoot in the Hungarian State Opera House.

Unit photography by Murray Close, courtesy of 20th Century Fox.

Based on the 2013 novel by CIA operative turned fiction scribe Jason Matthews, *Red Sparrow* continues the long-running collaboration between Belgian cinematographer Jo Willems, ASC, SBC and director Francis Lawrence, who first met on a P.O.D. music video in the early 2000s. The two had most recently teamed for the final three installments — comprising some 250 shooting days — of the *Hunger Games* franchise (*AC* Dec. '15), which also found Jennifer Lawrence in front of the camera. After completing that saga, Francis Lawrence was ready to explore a new aesthetic. The director explains, "I wanted to get out of the handheld world of what I call 'faux-naturalism' that we used on the *Hunger Games* films, and I wanted to get onto dollies and cranes, and to find more graphic, symmetrical frames."

The change in style, however, did not alter the basic tenets of Willems' philosophy. "*Red Sparrow* is a stylized film, but I strived to create a look that felt authentic and naturalistic, not artificial, theatrical or forced," the cinematographer notes. "I wanted to create a visual world that didn't overpower, but one that was in balance with the story.

"I try to be as efficient with lighting as possible," Willems continues. "More than on any other film, I let myself be led by the locations we chose. There are a lot of practical considera-

Seduce and Destroy

Gear Spotlight: LiteMats

Over the years I have used many tools to create soft lighting, from covered wagons to Nine Light Maxis behind large frames of heavy diffusion, from strings of Christmas lights to China balls. I've even used [ASC member] Harris Savides' infamous 'Bling light.'

But as the years have gone by, I've strived to make the shooting process more efficient, and to streamline my equipment. On *Red Sparrow*, that smaller footprint was a necessity. Director Francis Lawrence liked to have a shooting angle of at least 270 degrees, and often we'd see 360 degrees. We needed a tool that was easy to hide and didn't take up a lot of space, but could still create that soft light.

LiteGear's LiteMats brought exactly what I needed for many scenes in *Red Sparrow*, and I used them extensively on the film. We shot 100 percent on location, often in small spaces and in sensitive historical buildings where we couldn't rig any heavy or large equipment. LiteMats allowed us to transcend those restrictions. They are light enough to be taped to ceilings or walls, or to be hung off long menace arms. They provide beautiful skin tones — equally as nice as tungsten lights. They are dimmable without color-temperature change, they can be controlled remotely and, most importantly, they provide a very soft light.

It's not the only light we carried on the truck, but LiteMats truly have become my favorite lighting instrument for interiors. I wish they had a little more output at times, but hopefully that will come!

— Jo Willems, ASC, SBC

Dominika is sent to find and engage with the target of a Russian intelligence operation.

tions to make when shooting a film on location, so you have to go in with an open mind."

Indeed, *Red Sparrow*'s reliance on real locations aided the filmmakers' quest for verisimilitude. During the movie's 85 days of principal photography — which began in January of 2017 and stretched from Budapest to Bratislava, London to Vienna — all 45 of the feature's locations were practical. "We didn't spend one day on a soundstage," says Lawrence. "Jo definitely had some tricky challenges because we were in real environments — like being in an apartment for nine days on the fifth floor of an abandoned building in the middle of Budapest."

Gaffer Walter Bithell says that merely getting equipment to set could be a monumental undertaking. "Some of the buildings were constructed before elevators existed, and most of the elevators that were present could not handle the size or the weight of the gear," he recalls. "Sometimes we used ropes and pulleys [to move equipment], and occasionally we could use condors and scissor lifts, but a good portion of the camera, grip and electric gear was hand-carried piece by piece up anywhere from two to six flights of stairs."

That equipment included a broad array of Panavision anamorphic lenses. After working with C Series anamorphics on the *Hunger Games* movies, Willems shifted to E Series and newer T Series lenses to capture *Red Sparrow*'s wintry intrigue. "The C Series has a softness and a slight period feel to it," Willems notes. "I love those lenses, but for *Red Sparrow* I wanted the sharpest glass I could get [in order] to achieve a contemporary feel rather than period."

Only the 35mm, 65mm, 100mm, 135mm and 180mm T Series primes were available when *Red Sparrow* went into production, so the package was rounded out with 40mm, 50mm and 75mm E Series primes, as well as a handful of C Series and G Series optics. A trio of Panavision anamorphic zooms — a T Series AWZ2.3 37-85mm (T2.8), an ATZ 70-200mm (T3.5) and an ALZ3 270-840mm (T4.5) — were employed for expediency in certain situations, such as those involving crane work or car mounts.

The Panavision lenses were coupled with a pair of Arri Alexa XTs and an Alexa Mini. Willems typically rated the cameras at 800 ISO while capturing 3414x2198 ArriRaw images in Open Gate mode. The recorded frame was then cropped to the desired

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Seduce and Destroy

The crew captures Sparrow School exteriors at the Festetics Palace in Dég, Hungary.

2.39:1 aspect ratio during postproduction.

The XTs recorded to 512GB Codex XR Capture Drives, while the Mini recorded to CFast 2.0 memory cards. The Mini played when its small form factor was required, such as atop camera operator Dave Thompson's Steadicam or crammed into a tight spot in one of the locations.

Red Sparrow's shooting schedule began at Budapest's fully functioning Hungarian State Opera House, which provided the setting for Dominika's fateful ballet performance. To light the opulent 19th-century performance space, Willems mixed his units with those already in place at the venue. Thus the opera house's existing Robert Juliat ellipsoidal follow-spots and Chauvet LED washes were combined with the production's HMI follow-spots, Arri SkyPanels, LiteGear LiteMats, and tungsten helium balloons from the Germany-based Balloonlight.

"We had to squeeze in our shooting times between the regular opera shows," Bithell says of the location. "We had crazy call times that started right after the opera was finished. Upon completion of each day's work, we had to pull everything out to make room for the next opera show." The art department began work at roughly midnight. Willems and the grip and electric crew lit the space from 2 a.m. until 6 a.m., and then the production shot until 3 p.m., at which point they'd get booted to make way for the opera's next public

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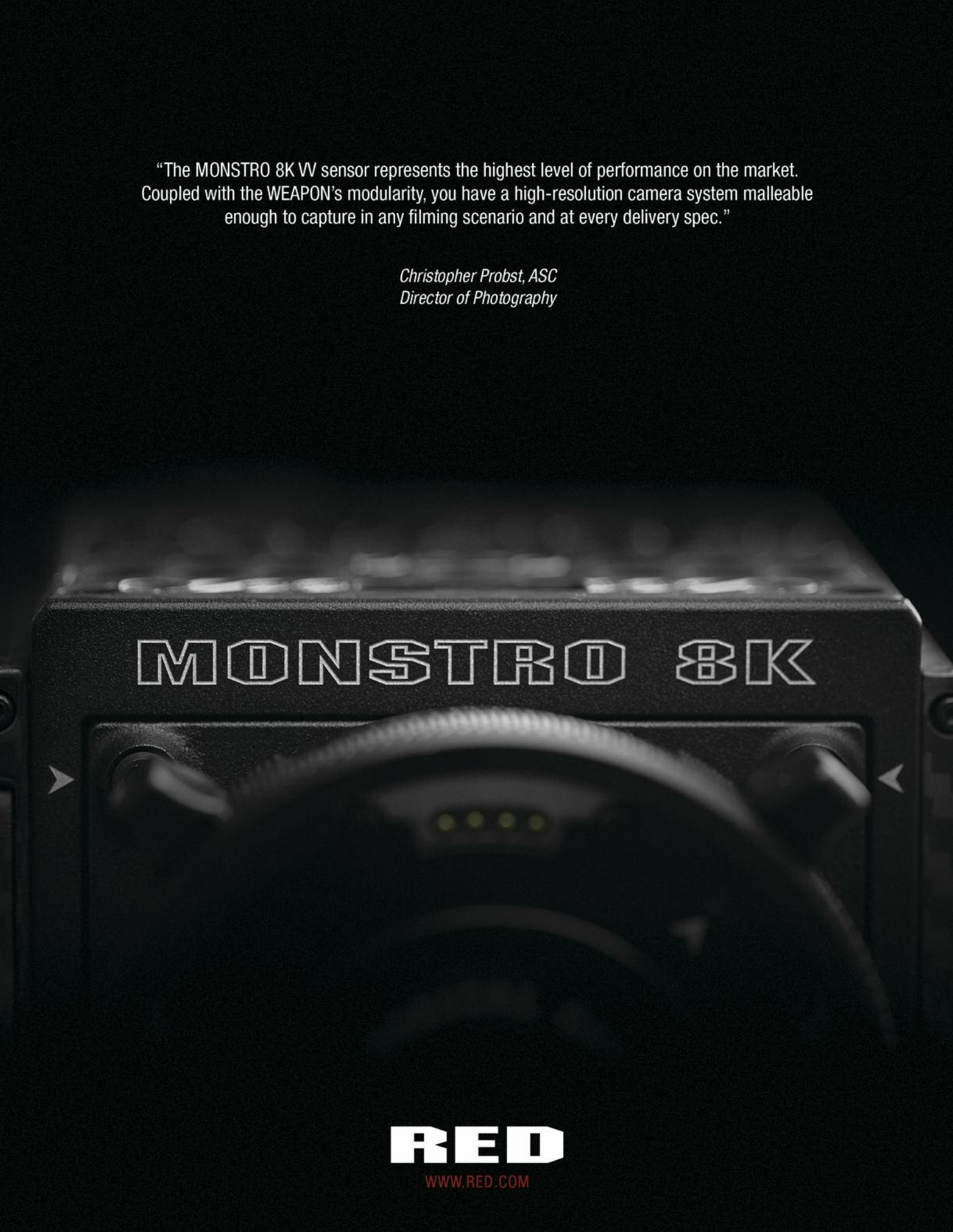

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Seduce and Destroy

A Servicevision Scorpio 45' telescoping crane with a Flight Head V gyrostabilized remote head is employed for swimming-pool interiors featuring Joel Edgerton as CIA agent Nate Nash.

performance. In total, the crew had four days to shoot out the opera house. "It was the hardest location of our shoot, and I was very happy it happened early," says Willems.

A climactic prisoner exchange shot at a former Soviet military air base in Tököl, Hungary, proved nearly as difficult. The "set" included 3,000' of runway — not an inch of which had any functioning practical lights. London-based fixtures foreman Joe McGee was brought in to assist with custom runway fixtures — for entrance, threshold, centerline and edge demarcations — that had to be built, wired and installed. For the runway approach lights, 72 medium-flood PAR cans, attached to truss towers, were used on each end of the runway. A half-dozen condors, each with one or two 18K Arrimaxes, were also employed, as were several HMI light cubes rigged to condors. "Eight Digital Sputnik DS6 units were modified to fit inside Wacker-style mobile light towers," Bithell adds. "There were also approximately 20 2K Blondes and 20 400-watt sodium-vapor units strategically placed in the background on the entire length of each side of the runway."

Everything was run wirelessly through a GrandMA lighting console. Haze from what Bithell describes as a "3,000-foot 'tube of death'" was provided by Germany-based Nefzer Special Effects to add to the atmosphere. "All the lights ended up being in frame," recalls Willems. "It's an airfield, so they didn't look out of place, but they

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Seduce and Destroy

Dominika works her wiles on Nate, who simultaneously hopes to turn her against the Russians and recruit her to the CIA's cause.

all were in shot and we just went with it."

The scene includes a long Steadicam shot as the prisoner exchange commences. "It was a classic spy-movie prisoner hand-off scenario, but in the Francis Lawrence style," Thompson explains. "Big but understated, with helicopters landing and taking off, gunfire, and about a quarter-mile walk-and-talk mixed in with all of it. The endurance of doing it for two long, cold nights was challenging." To provide fill on Jennifer Lawrence during that walk-and-talk, Bithell used a battery-powered and wirelessly controlled LiteMat 2 on a handheld light pole.

Lighting a sprawling airfield at night was not the time for a less-is-more approach, but when the opportunity presented itself, Willems embraced simplicity. He often used no lights for day exteriors — such as the training scenes at the Sparrow School, which were shot at the Festetics Palace in the village of Dég. Instead, Willems preferred to shoot at the optimal time of day to take advantage of natural light. That goal was aided by Hungary's almost constantly overcast skies. "We were lucky with the weather," the cinematographer says. "I think we had two days of sunlight the entire shoot. I tried to make those exteriors look as cold, oppressive and miserable as possible."

For night interiors, Willems relied heavily on LED units, particularly SkyPanels, LiteMats and Digital Sputnik fixtures. He also embraced existing practicals, turning a few off to create contrast, or replacing 600 fluorescent bulbs with 100-watt tungsten household globes. The latter technique was required for a scene set at the American embassy in Budapest, where Dominika begins her seduction of Nash during an evening event.

The cinematographer's choice to employ LEDs came in part from necessity, as the director has a penchant for setups that reveal a majority of the set, leaving little real estate for hiding lights. As Bithell puts it, "When you're shoot-

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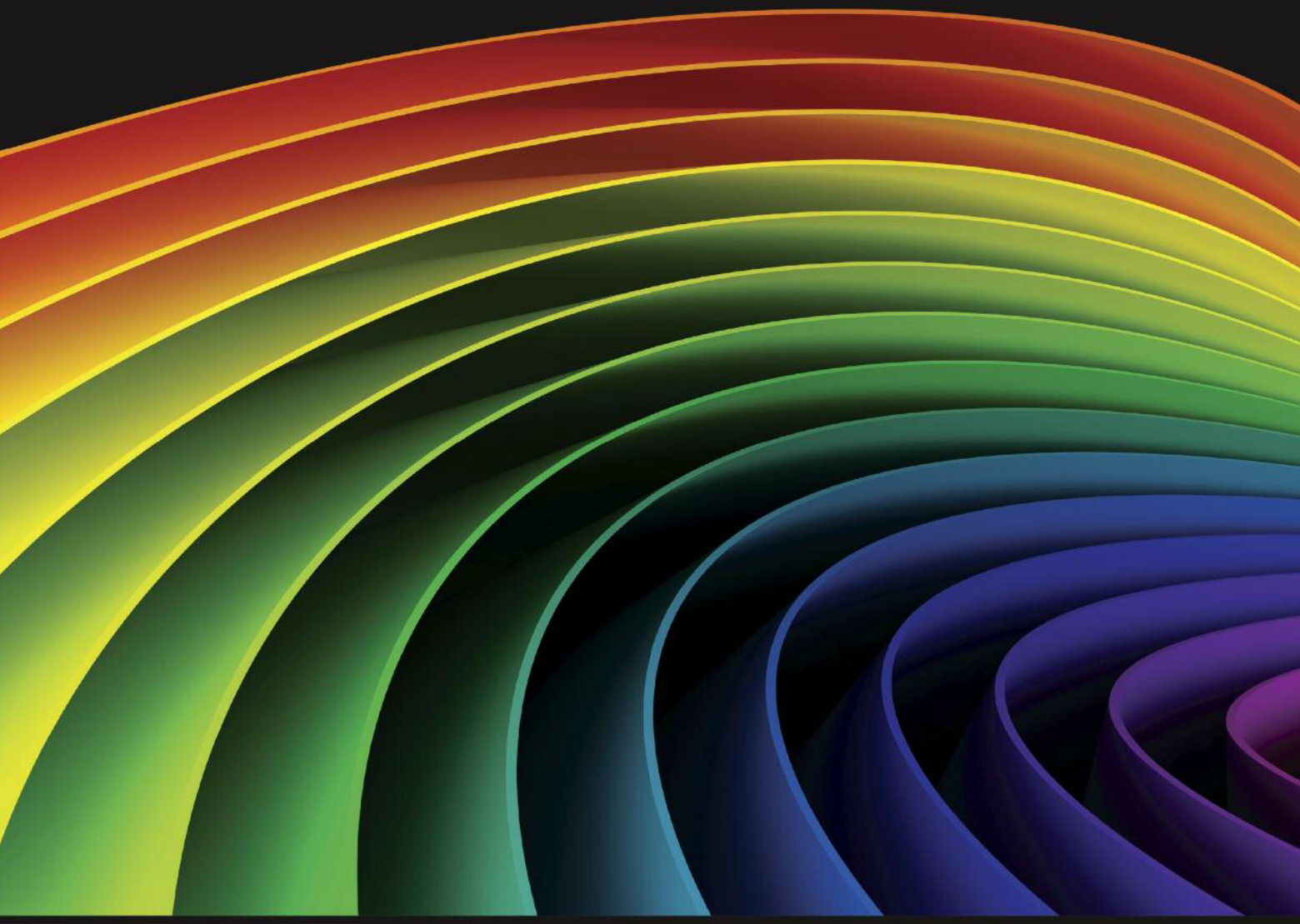

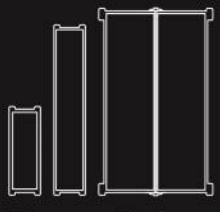

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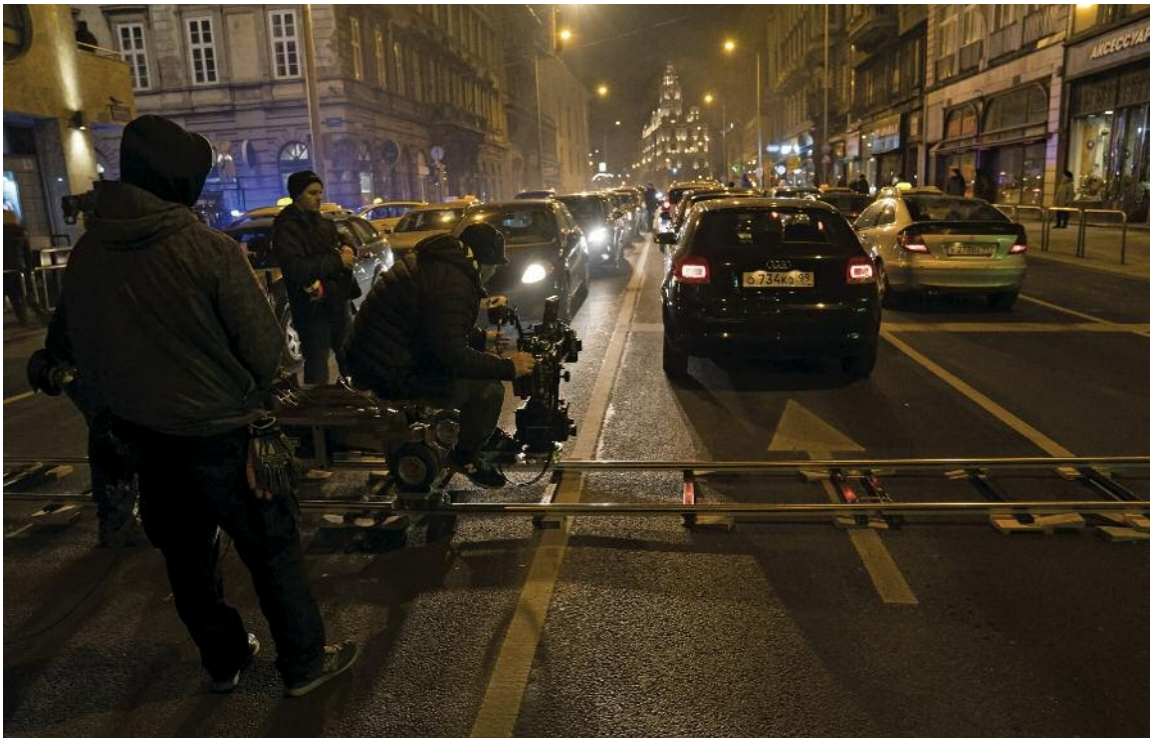
Seduce and Destroy

Right and below: Willems and crew capture night exteriors with the camera on a Chapman dolly. Bottom right: A Steadicam is employed to follow Jennifer Lawrence through a location.



ing on a Francis Lawrence set, you are definitely going to see the world."

Willems adds, "You have to be very strategic about where you're planning to put lights. Francis often likes to look one way and then hinge the camera 180 degrees to the other side of the room. You sometimes have just 30 degrees of the whole room to work with, and it's right beside the camera."

LiteMats became the hero units for those situations. (See sidebar, page 86.) They were powered off batteries to eliminate the need to hide cables, and were controlled via wireless DMX from RatPac Cintennas. Bithell and crew had to be creative in their rigging, using tape, sash, rope or Velcro to attach LiteMats to ceilings and walls, or using grip rigging to affix units to pillars, furniture, chandeliers or moldings. "Each location presented its own special challenges," says Bithell. "We would use whatever we could find to mask the presence of our lights. At one point we even hid lights behind gravestones at the Hungarian version of Arlington National Cemetery."

A pair of action scenes also leaned heavily on LiteMats. In the first, Dominika enters a steam room to take revenge on the two dancers who plotted her onstage accident; for the steam-shrouded scene, LiteMats supplemented fluorescent practicals, while Arri T12s and T5s blasted through the room's windows. In the second scene, a knife fight at Nash's home in Budapest, the action was lit almost entirely with LED fixtures.

"We actually shot the knife-fight scene day-for-night," Bithell explains. "We blacked out the windows to the entire apartment and installed two custom LED panels into the windows of the kitchen to replicate sodium-vapor streetlight from below. These panels were custom-built by our local fixtures

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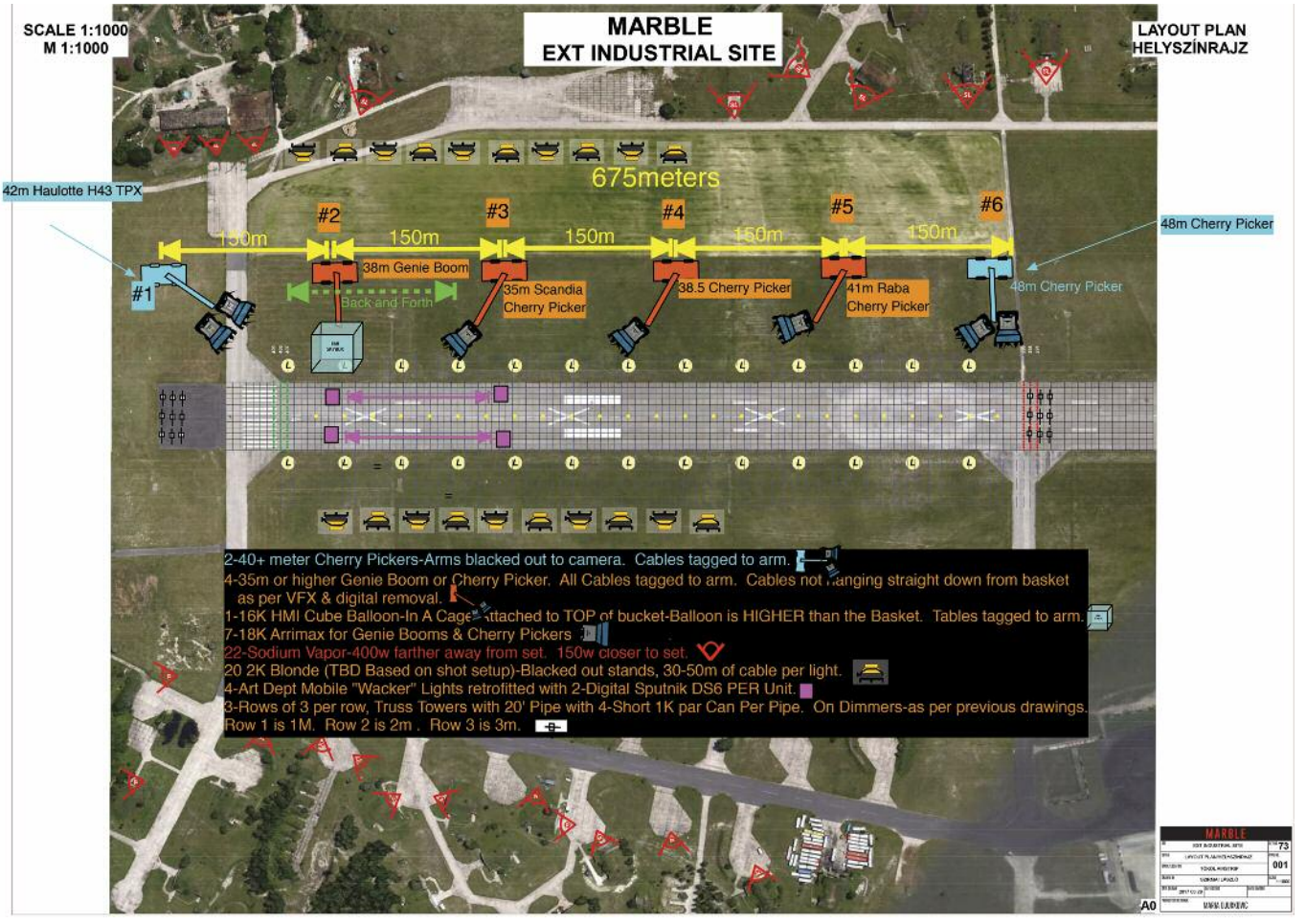

Lighting diagram courtesy of Walter Bithell.

Top: This lighting diagram illustrates how Willems and gaffer Walter Bithell approached lighting the movie's climactic night exterior, which was staged at a former military air base in Tököl, Hungary. Above: Cast and crew capture the action at the airfield.

crew; they installed 430 feet of RGBA LED ribbon onto four sheets of Coroplast that were fitted to the exact dimensions of the windows. Wireless, battery-powered LiteMat 4s and 2Ls were used along with the custom LED window panels, which were also controlled wirelessly but powered by regular electricity."

Both scenes are brutally violent, but that brutality is brief. "The violence in the movie has a slow-burn buildup and then is over after a quick explosion," the director explains. "We were aiming for a gritty, visceral, almost naturalistic version of that kind of violence, versus the 'ballet' of it."

For the on-set color workflow, Willems and Company 3 colorist Dave Hussey collaborated during preproduction to develop a show LUT, a process that took several weeks of trial-and-error. "Jo wanted a more organic look for the

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Seduce and Destroy

The camera rolls for a scene featuring Mary-Louise Parker, who portrays U.S. diplomat Stephanie Boucher.

film, something that didn't feel too pushed or stepped on," says Hussey. "We spent some time experimenting with various LUTs on test footage that Jo shot. Eventually we created a LUT that had a softer roll-off in the highlights and deep blacks without looking crushed."

On set, Willems and digital-imaging technician Dániel Farkas applied the LUT to the Log C image coming from camera, and then took turns manning Tangent's Element and Ripple panels to make CDL changes via Pomfort's LiveGrade. A pair of Flanders Scientific DM250s were used for monitoring. "I'm constantly coloring on set," says Willems. "I color almost every shot [through] the whole movie. Then we pull stills, and that becomes our grading reference. If you look at those stills from set, they are not that far off from the final grade."

Those stills, along with the CDL adjustments, were sent from set to Colorfront in Budapest for the creation of dailies. The stills also played a key role in

the final digital grade. "I loved the look of those stills, and I used them as a reference while I did the pregrade," says Hussey. "It saved us an incredible amount of time."

Hussey worked with 16-bit EXR files in Blackmagic Design's DaVinci Resolve 14, monitoring with a Barco DP2K-P projector paired with a Stewart Filmscreen projection screen. After the colorist spent nine days on his initial pregrade, it was time to share his work with Willems. "He had done the grade based on the stills, and it was like, 'All right, Dave, nice work. Let's go home,'" Willems recalls with a laugh. "I've never done a DI so fast in my entire career. I went in there for a week and we were finished."

Willems says he's extremely proud of the look of the movie, even if he can't quite pin down how to describe *Red Sparrow*'s mixture of realism and stylization. "I really don't know how to define this movie," says Willems. "It's obviously not 'Ken Loach,' because he would just turn up and start shooting, yet I still feel it's naturalistic in its lighting. Maybe I should call it 'enhanced naturalism,' or 'stylized naturalism'?"

Click here for a diagram detailing the Opera House lighting.

weblink: https://ascmag.com/articles/red-sparrow-lighting-diagram ●

Francis Lawrence confabs with Edgerton in a pedestrian tunnel that's seen onscreen in the movie's opening minutes. "We didn't spend one day on a soundstage," the director says of the production.

TECHNICAL SPECS

2.39:1

Digital Capture

Arri Alexa XT, Mini

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Daring Operation

Lula Carvalho, ASC, ABC and director José Padilha continue their collaboration with the historical thriller *7 Days in Entebbe*.

By Michael Kogge

•|•

In June 1976, a pair of German revolutionaries teamed with two men from the Popular Front for the Liberation of Palestine (PFLP) to hijack an Air France flight that carried 248 passengers. The pilots were forced to land the plane in Uganda's Entebbe Airport, where the hijackers held the passengers hostage in an old, disused terminal. Most of the non-Israeli hostages were freed, but the hijackers demanded the release of a number of Palestinian and other prisoners — who were predominantly in Israel — in exchange for the Israeli hostages. They threatened to kill the hostages if their demands were not met. For days, Israeli Prime Minister Yitzhak Rabin and his cabinet of advisors, chief among them Defense Minister Shimon Peres, debated whether or not to negotiate with the hijackers, until a rescue mission was decided upon and executed.

The events of this tense week form the story of director José Padilha's *7 Days in Entebbe*, shot by Lula Carvalho, ASC, ABC. Carvalho and Padilha were no strangers to each other, having shared a history of fruitful collaborations, including the two *Elite Squad* movies, the 2014 remake of *RoboCop*, and the series *Narcos* and *The Mechanism*. Though

Opposite: The feature *7 Days in Entebbe* recounts the real events of June 1976, when German militants Wilfried Böse (Daniel Brühl) and Brigitte Kuhlmann (Rosamund Pike) helped to hijack an Air France flight en route from Tel Aviv to Paris. This page, top: Zeev Hirsch (Ben Schnetzer) is part of the Israel Defense Forces that execute a daring rescue mission. Middle: Cinematographer Lula Carvalho, ASC, ABC. Bottom: Director José Padilha.

Unit photography by Liam Daniel, courtesy of Focus Features.

both hail from Rio de Janeiro in Brazil, they came to filmmaking in different ways. Padilha studied mathematics and physics at university, then was hired by an investment bank to calculate derivatives. Detesting stock-market work, he took a sabbatical to help a friend produce a "cinematographic essay" on the destruction of the Amazon rainforests — a project that led to a full-time detour into filmmaking.

Carvalho, on the other hand, is the son of the celebrated Brazilian cinematographer and director Walter Carvalho, ABC. In the Carvalho household, film periodicals like

Daring Operation

Gear Spotlight: Using Tungsten for Daylight

"When lighting, I always look for the drama," says Lula Carvalho, ASC, ABC. "As cinematographers, we have to be part of the story, helping the characters and the script to become alive. In this case, we were talking about a real story that happened in a certain period in history. On the one hand, we used practical lighting fixtures so people could see the story as a real one. On the other, we mixed those elements with the narrative and mood so we could help the director build the drama of these characters."

To emulate daylight for the movie's interiors — and especially for scenes set inside the Entebbe airport terminal — Carvalho and gaffer Shawn White deployed tungsten fixtures such as Dinos and 20Ks rather than LEDs or HMIs. "Even though HMIs would have given us more strength, which could have helped, I decided to go with tungsten because of the color and the natural feeling of it," Carvalho explains. "Tungsten's rays gave us a 'deepness,' with texture on the faces — and this added to the drama of the story. It would have been an easier path to go with HMIs, but it would not have created such a tense and dramatic environment.

"It's a very tough decision for the cinematographer, which kind of light you're going to use to play [as] the sun," Carvalho adds. "HMIs are stronger, but they have a certain color, texture and feeling that is not necessarily the most beautiful. The choice of tungsten meant we were not going with the easiest path, and I think it made a huge difference for the movie."

— MK

Ugandan President Idi Amin (Nonso Anozie) supports the hijackers and allows them to land at Entebbe Airport.

American Cinematographer were cherished objects. "I grew up with the ASC magazine, started learning English with it, studied the cinematographers in it, and translated it to my father," Lula Carvalho remembers.

By the time he was eight, he would spend his summer break with his father on location. "After a while, I really started to enjoy being on a set. Then, I began to learn the camera-crew craft, as I started helping the ACs and clapper loaders. At 10, I was loading film magazines. The whole process of filmmaking completely thrilled me. When I became a teenager, I was already a professional. In high school, I worked as a second assistant camera. Because of that, I ended up not attending university — although I was enrolled as a history major."

For nearly a decade, Carvalho worked as a camera assistant and operator, taking on director of photography jobs on music videos and short films. It was Padilha who gave Carvalho his first big break, hiring him to shoot two documentaries: one unfinished, and the other *Secrets of the Tribe*, about the indigenous Yanomami tribes in the Amazon rainforest. Discovering that they spoke the same cinematic language, the director and cinematographer formed a lasting friendship.

During breaks on *Secrets of the Tribe*, Padilha pitched Carvalho the crime drama he wanted to make, *Elite Squad*, and they discussed potential shooting techniques. What resulted was a fast-moving, handheld style inspired by cinema-verité filmmaking and intensified by scripted action. "When I block the scene, I'm not going to block the actors rigidly," Padilha explains. "I'm going to let them move in the set freely between certain constraints, but I will never give them precise marks. Instead, I will give marks to the camera" — and the camera operator must follow the action as if shooting a documentary. This kinetic approach to *Elite Squad* garnered critical praise around the globe.

Producer Kate Solomon enlisted Padilha to direct *7 Days in Entebbe*, and the director in turn asked Carvalho to photograph the feature. Reading the screenplay by Gregory Burke, the cinematographer became excited about shooting a thriller involving a plane

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The captive passengers enter the Entebbe Airport terminal, where they are separated into Israeli and non-Israeli groups.

hijacking and Israeli politics. Rosamund Pike and Daniel Brühl signed on to play the two German hijackers, Brigitte Kuhlmann and Wilfried Böse, while Eddie Marsan would portray Shimon Peres.

Carvalho dove into the work, consulting with production designer Kave Quinn and costume designer Bina Daigeler on how best to reproduce the '70s period on the screen. "The color and the design of the wardrobe, the sets and the props, they tell us a lot about the time represented," the cinematographer notes.

> "We believed we should use a lot of handheld camerawork to give us the feeling and the tension of being alive."

"For the lighting, we looked for the appropriate temperature and design to match and enhance the mood proposed by production design," Carvalho continues. "In general, we believed a golden hue would make that happen. So the palette of oranges and browns was explored — but even if you want to create a brown and orange palette, you have to have hints of different colors. You have to have something to contrast so the colors you want come out. To add to the feeling of the Seventies and its colorful characteristics, we propped up reds and blues in the wardrobe. I believe this mix gave the film a Kodachrome feeling, which was what we looked for."

Padilha frequently relies on a handheld camera for his narrative features, and *7 Days in Entebbe* proved no different. "The story we were portraying was real, and we believed we should use a lot of handheld camera-

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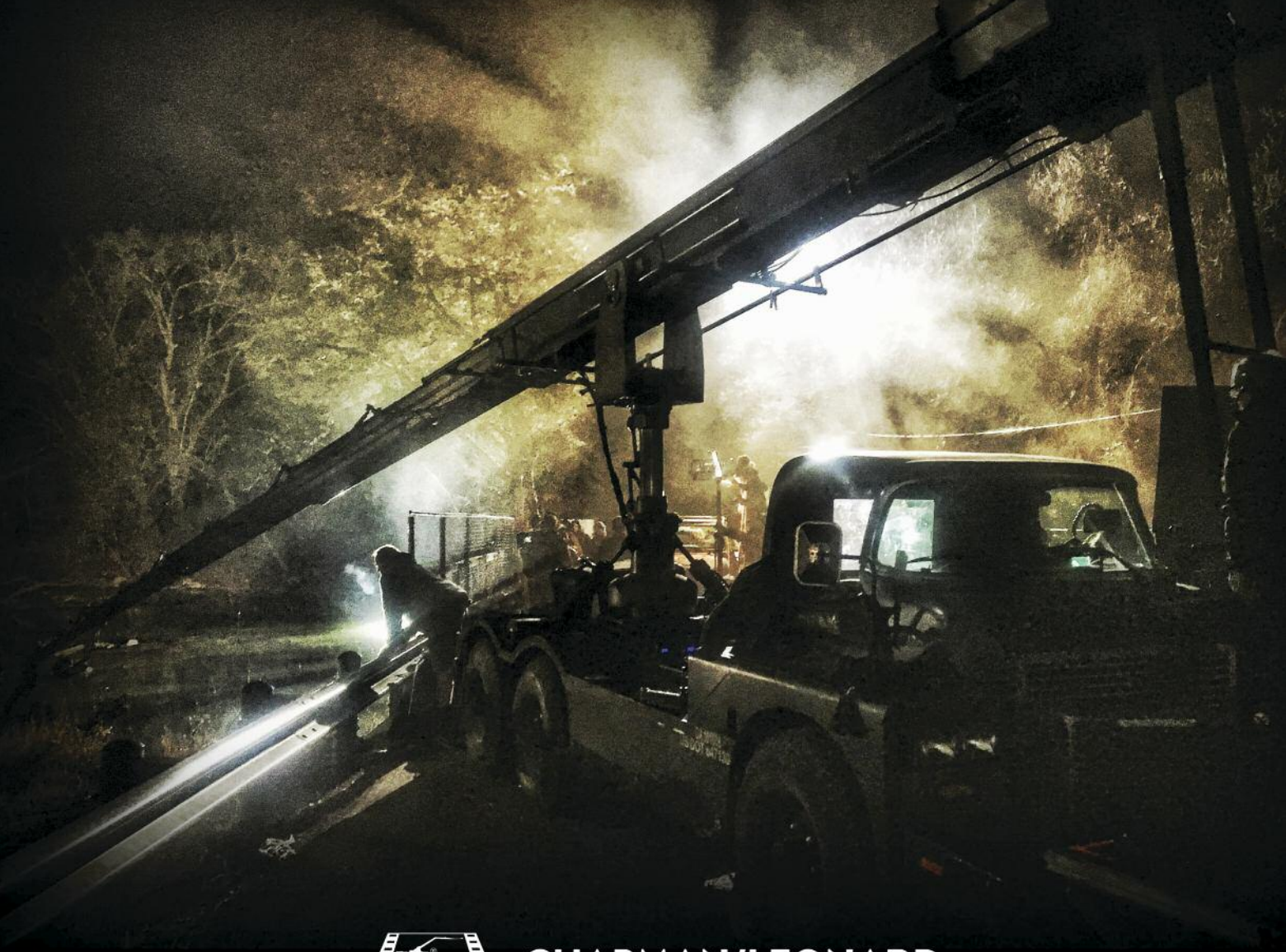

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Daring Operation

Right and below: London's Harrow Civic Centre provided the production with locations for the Israeli government, including scenes of the administration deliberating on its response to the hostage crisis. Bottom: Carvalho captures a scene between Eddie Marsan (left, portraying Israeli Defense Minister Shimon Peres) and Lior Ashkenazi (as Prime Minister Yitzhak Rabin).

work to give us the feeling and the tension of being alive," Carvalho notes. However, where he and Padilha had opted for the 1.85:1 aspect ratio on the *Elite Squad* movies — as they found the taller ratio to be beneficial for capturing fluid movement while de-emphasizing horizon lines — they decided to frame *Entebbe* for the 2.39:1 aspect ratio, shooting spherically with CW Sonderoptic's Leica Summilux-C primes almost exclusively. "We thought the merging of this visual element along with the movement of the hand-held camera was the best way to tell this story," Carvalho emphasizes. "It makes the camera moves very strong."

Despite the widescreen aspect ratio, Carvalho says, "We did not want the 'anamorphic look.' We needed more flexible lenses so we could [work at] slower stops and would have closer minimum focus."

As he has on his other projects with Padilha, Carvalho would operate a camera himself for *Entebbe*, sharing the responsibilities with operator Vince McGahon. "For my methodology to work, I need a camera operator who understands documentary filmmak-

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Top: Amin oversees the release of the non-Israeli hostages. Middle: Amin addresses the hostages. Bottom: The crew readies a scene with Anozie at the president's desk.

ing," Padilha says. "Lula does. And so together we've developed this way of shooting. We never use tripods. We like the camera to be alive and searching for the action."

Carvalho relishes the opportunity to explore scenes in this way. "The handheld camera — it's what I like the most in life. It's my favorite toy of all time. José's so smart; he understands that the more free I am, the better I get. Then you can really follow your heart, you can follow your eyes, your instincts, and in the handheld world that gives you the best results. And when you find actors that also like to play this way, it's amazing. It's you and the actors playing with your heart and your feelings to make the scene happen."

> "We needed flexible lenses so we could work at slower stops and would have closer minimum focus."

With a crew that also included A- and B-camera 1st ACs Nathan Mann and Richard Jakes, respectively — "The two of them did an amazing job pulling focus," Carvalho says — as well as key grip Jim Philpott, Carvalho shot digitally, using two Arri Alexa Minis for the handheld scenes and an Alexa XT Plus for high-speed shots at 100 fps. With the Mini, they recorded MXF/ArriRaw files to 512GB SanDisk Pro CFast 2.0 cards; with the XT, they recorded ArriRaw to 512GB Codex XR Capture Drives.

The handheld cameras were outfitted with Vislink L1700 wireless HD transmitters, and live footage was viewed on the set on a Sony PVMA250 25" OLED monitor; tighter spaces, such as the back of vehicles, necessitated viewing on a Sony

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Daring Operation

Above: Lt. Col. Yonatan Netanyahu (Angel Bonanni) commands the Israel Defense Forces unit tasked with the rescue mission. Middle and below: Padilha works through the rescue mission with cast.

PVMA170 17" monitor. Digital-imaging technician Joe Steel worked with a Mac Pro system running Pomfort's LiveGrade, and he used Blackmagic Design Mini Recorders to capture Log C reference video and create CDLs that were later sent to the lab on a flash drive.

Entebbe had a shooting schedule of nearly 10 weeks, six of which were spent in Malta, where a terminal of the international airport doubled for the one in Entebbe. For night scenes at the location, Carvalho explains, "We chose warm tones to represent the exterior lighting, as if it was in the sodium-vapor world, and cooler tones, towards fluorescents, for the interior light. In both scenarios, we had practical lighting with those main colors, as well as some opposite color tones to create a rich and realistic environment."

For night exteriors outside the terminal, gaffer Shawn White suggested they use Philips Vari-Lite VL3500 Washes arrayed on cranes, with 16 VLs on each. These remote-operated moving lights offered the flexibility to change their color, focus them into a pool, or spread them over an area; they were rigged in two configurations, one without any diffusion, and the other with a cube of Light Grid.

In addition to the Summilux-Cs, Carvalho often employed a 14mm Arri/Zeiss Master Prime, and although he wasn't strict about maintaining a consistent T-stop, he offers, "I like working between 2.0 and 2.8 in the digital world. In some scenes, we went under 2.0, when we really wanted to separate some specific element and leave the background blurred."

Principal photography also took the production to London for three weeks. There, the art department found the Harrow Civic Centre offered the Brutalist architectural style they sought for the Israeli government locations. The production shot in the council chambers, the parking lot and the members' lounge. "There was a lot of tension between the characters who were negotiating the hijacking situation," Carvalho says. "Kave found this amaz-

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Top and above, left: The commandos have one week to plan and rehearse their rescue operation. Above, right: The crew prepares to roll with the camera atop a crane.

ing location with wooden walls, and we used tungsten lighting to replicate sunlight coming through the windows for pretty much all of the day scenes in the building." (See sidebar, page 102.)

Meanwhile, the interior of the Air France plane was re-created on a soundstage at London's Ealing Studios. "On the first scene inside the plane, we rigged a tungsten 20K Fresnel on a crane so we could move it during the shot and create the feeling that the plane was actually flying," the cinematographer notes.

For the final week of production, the crew traveled to Israel to shoot the Batsheva Dance Company because Padilha wanted to open the movie and intercut the finale with a performance of choreographer Ohad Naharin's staging of the Passover song "Echad Mi Yodea." In the movie, a girlfriend of an Israeli solider is a member of the company, and when the soldier goes on the rescue mission to Entebbe, she enacts the crucial part of the dance, falling out of her chair time and again.

Though Naharin didn't create the dance until years after the events of *Entebbe*, Padilha says that its inclusion

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Daring Operation

Hirsch and his fellow commandos execute the rescue mission at night.

in the movie "was an artistic freedom I took because I thought that the meaning of the dance was very relevant. The movie is about whether Israel wants to negotiate or not, and the pros and cons of negotiation. The dance shows dancers dressed in Orthodox Jewish clothes, and as the dance progresses, they make movements of self-inflicted pain. But they make fewer movements as they start to undress themselves out of the Orthodox clothes — they become more secular. And the one dancer who doesn't take off the clothes keeps dying, keeps falling out of her chair. I thought this was a great metaphorical way to make a political statement in the movie."

In capturing the dance, Padilha and Carvalho maintained their commitment to shooting handheld. "It was very tough physically," Carvalho admits. "That ballet piece takes six to seven minutes. And then José and I were trying to get what we needed, so

we were like, 'One more time, one more time.' But when the music played, it was so strong that you could feel the energy. It was one of the most unforgettable experiences I've had. I was with those dancers, inside the dance."

During postproduction, senior colorists Greg Fisher and Paul Ensby graded the footage at Company 3's London facility, where they worked with a Barco 4K projector. Fisher — who finalized the grade following Ensby's initial pass — had joined the production near the start and created a look-up table for Carvalho to reference while shooting; Carvalho's on-set monitor was calibrated to make sure that what the cinematographer saw during production matched what he would see at Company 3. Carvalho sat in throughout the final grade, which was performed with Blackmagic Design's DaVinci Resolve 12.5.

"We made use of a tweaked print-emulation LUT in the grade to help give the images a bit more of a 'film look,'" Fisher says. "There are times when colorists might use a LUT that is more pronounced and with a very warm white point to really drive home the period look, but this was more subtle. It just meant that the images had more of a film-like quality."

Fisher also did an HDR pass on the footage for the movie's HDR release. "There is a significant amount of contrast in the shots even in standard dynamic range, so it's not as if it's a completely different look," Fisher says, "but it was nice to be able to take advantage of what HDR offers."

Reflecting on his work, Carvalho sees a unifying principle. He offers, "I believe the magic of cinematography is to try to merge emotion, poetry, technique, lighting, framing, breath and tension through the camera, working together with the director, actors and the whole crew." ●

TECHNICAL SPECS

2.39:1

Digital Capture

Arri Alexa Mini, XT Plus

CW Sonderoptic Leica Summilux-C, Arri/Zeiss Master Prime, Angenieux Optimo

FILMMAKERS' **FORUM**

A weekend trip forces childhood friends Sahil (Dhruv Ganesh) and Jai (Shiv Pandit) to explore their true feelings for one another in the romantic drama *Loev*.

Digging Deep Into My Vocation

By Sherri Kauk

One episode every two-and-a-half days. A new director each week. Thirty weeks shooting back to back — for almost seven months. I am an indie cinematographer being offered to shoot Seasons 3 and 4 of the CBS Saturday-morning series *The Inspectors*. For emerging cinematographers who shoot one, maybe two features a year — and with indie shoot schedules averaging 16-22 days — being able to stand on set every day is a boon. I am pumped for this yearlong cinematography craft intensive. By the end of the run in December 2017, I will have reframed how I speak about the experience, understanding it more fully as an instruction in craft, collaboration and sustainability.

Craft

Rewind to May 2017. I am settled into the stage in Charleston, S.C., prepping for *The Inspectors*. Netflix has just released director Sudhanshu Saria's debut feature, *Loev*, under its exclusive worldwide acquisitions banner. We shot *Loev* in the summer of 2015 in Mumbai and cities including Mahabaleshwar and the Sandhan Valley. We shot for 16 densely humid days, moving through 32 locations and racing to capture exteriors before the monsoons released their summer fury.

Shooting and handheld-operating this ultra-low-budget feature, I shifted strongly away from small-form camera bodies and full-frame sensors. Initially, this put production in a monetary bind, because Red Epics and Scarlets, Canon 5Ds, and the Franken-rigs that support them were more readily available for our budget level. We even tested the Red One. But Arri had just released its Alexa XT, and its handheld form factor — echoing 16mm film-camera greats like Arri's own 416 and Aaton's XTR Prod — and its ability to sensor-crop from 35mm to Super 16 made this the camera system best suited for *Loev*. Because *Loev* consists of tension-developing, dynamically blocked long takes, I needed to ensure we were laying down technically sound takes so editorial would be building the film based on performance and not technicalities.

Wanting to set up first-time focus puller Achyu Dwivedi and myself for success, I pitched that we shoot Super 16 format for dialogue and 35mm sensor for wide establishing shots. Our producers at Bombay Berlin Film, Katharina Suckale and Arfi Lamba, connected with Arri head of sales Hans Salzinger. Hans pitched back: If I could light to one stop deeper to protect focus concerns, the slightly older-model Alexa Classic in ProRes 4:4:4 would be a phenomenal indie camera option capable of delivering big value. Forgoing raw streamlined the post workflow and helped our shoestring budget.

Shooting handheld with the Alexa, with Arri's EVF as reference and my light meters at my hip, was cinematography set free.

Loev photos by Oankar Chavan. *Murder Made Easy* photo by Tim Davis. All images courtesy of Sherri Kauk.

For Achyu and crew, the camera's industry-standard workflow set them free as well.

In addition to the Alexa Classic package, I carried my Blackmagic Pocket Cinema Camera with PL mount for car work, guerrilla shots, and as a backup body. I appreciate its Super 16 sensor, 10-bit color space, and how well it can match the Alexa's color space.

We shot *Loev* with a 35mm and a Super 16 set of Zeiss Super Speeds. There is a "honeymoon" portion of the film, which takes place outside in the breathtaking Sandhan Valley. Shooting this portion almost wide open, and allowing the Super Speeds to bloom the highlights and edges, echoes the gentle whimsy that our characters, Sahil and Jai, feel.

Collaboration

I'm feeling great. Prep month for *The Inspectors* has come to an end, and we are deep into shooting Season 3. While shooting today, I steal away with gaffer Ben Baggott and key grip Dave Justice to discuss pre-rig needs for next week's sets; I pop into tomorrow's swing sets to touch base with set decorators Missy Ricker and Cara Rhodes, and to share coverage notes I've gleaned from this week's director; I stop by production designer Leslie Keel's office to review previs images for the sets she's designing four episodes out. Keel and I have devised denotations in our breakdowns to qualify sets as "Full Sets" or "Long Lens Limited Sets" to stretch both budget and time. "Full Sets" offer 360-degree shooting, which Keel builds out in great detail. "Long Lens Limited Sets" are targeted at short scenes or one-off locations where coverage requires only one or two set walls and less detailed finishing.

When I need to step away, I am covered because I have a camera team whose members each work like cinematographers in their own right. Shooting with two Red Epic MXs — production-company owned — fitted with a shared set of Bausch & Lomb Super Baltars, A-camera/Steadicam operator Robert Arnold leads our camera team, with B-camera operator Jake Butler delivering that extra, critical piece of coverage.

I love saying "let's figure out how" to showrunner Bryan Curb and our visiting directors. Getting into their minds is the best part of my job, because everything is imaginary until the director calls "action" and the camera rolls. I want to know we are creating from complementary points of inspiration. When all of us are in sync, I don't call it "making the day"; I high-five the team and exclaim, "We have *won* the day!"

During a rare break in the day, I pause to remember just three months back, when I was interviewing to shoot *The Inspectors*. I was in Atlanta co-leading a Julie Donovan-organized camera-operating workshop alongside Geoff Haley and Hilda Mercado. The major differences between shooting an indie project like *Loev* versus a studio project like *The Inspectors* were on my mind. I asked Geoff, whose career had risen through the film ranks from shoestring to blockbuster — at that time he had just wrapped *The Fate of the Furious* — for his opinion.

"There is no critical difference," he

Right: Cinematographer Sherri Kauk (holding the camera) and crew capture a scene with Ganesh and Pandit in India's Sandhan Valley. Below, left: Kauk lines up a shot on Jessica Graham on the set of director David Palamaro's *Murder Made Easy*, which Kauk shot between *Loev* and *The Inspectors*. Below, right: Kauk frames a car-to-car night exterior for *Loev*.

replied, "In the end, every production is challenged by the same beasts — not enough money and not enough time. The only difference is the scale and perhaps the source of the challenge, but the challenges will always present themselves."

I was skeptical then, but smile now. Shifting from a 16-day road-trip movie in India to a seven-month soundstage series in Charleston has presented insane hurdles stemming from time and money crunches. The scale and source of the challenges have varied vastly, but the challenge, as he assured, remains.

I learned, for example, when I started Season 3 of *The Inspectors*, that the B camera had previously worked only 30 percent of the time. I immediately adjusted the blocking to support both A and B cameras whenever possible, and we now run two cameras 90 percent of the time. This time saved on coverage is twofold, because apparently editorial loves it, too. Curb shared this tidbit with me: Laying down multiple camera angles per take streamlines editing for both continuity and performance when cutting a scene. Employing two cameras helps the crew make our day and the editors make theirs. "Winning!"

Months later, with the end of Season 4 in sight, we wrap for the day. I am exhausted, feeling a long way from home, and working every day to keep the everyday shooting "fresh."

Sustainability

For its premiere and second seasons, *The Inspectors* delivered one episode in five shooting days. I arrived on Season 3 with production having scheduled an episode every three days. By

Season 4, we're shooting each episode in two-and-a-half days. I don't know entirely what to think about this, except to say I saw the same panic and frustration hit each director, each week, on their first day of shooting, as the speed with which we flew pressured their craft. I felt it too — on Episode 404, which I directed.

This is where the word "crew" becomes critical in its essence. We kept each other afloat and engaged. As the episodes progressed, we challenged ourselves around a craft area — we had a color-splash episode, a dynamic-range episode, a lighting ratio/big-window-key vs. overhead-interior-key episode. Crewmembers bumped up at times to gain experience. The shorthand and workflow we'd established over the year made every challenge surmountable.

On a personal note, initially, swimming before and after work charged me, and kept me refreshed and centered. As we entered the chillier months, and when the shooting schedule expanded from 10-hour days to 12-hour days — along with added weekly lunch meetings and pre-call scouts — my time for swimming drained. Indeed, my time for anything outside of work dried up.

The need to have a counterbalance to work, even as work hours consume the majority of the day, is critical. On my next adventure, I will stay near an indoor pool, where I can swim during all seasons. I also support the 10-hour "French hours" schedule, which likewise supports a more balanced, healthier family life.

This area — sustainability — is critical. When I maintain peak overall health, I can offer peak collaboration and skill. As my energy, health or well-being wane, what I am able to lend of myself diminishes. This area is a part of our vocation I'd like to hear us all talk more about. Whereas craft and collaboration rule the set, sustainability keeps us on those sets for years to come. ●

NEW PRODUCTS & **SERVICES**

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Panavision Upgrades Millennium DXL

Panavision has introduced the Millennium DXL2 8K camera. The large-format camera is the heart of an imaging ecosystem that incorporates Panavision's optics and camera architecture, Red Digital Cinema's Monstro 8K VV sensor, and Light Iron Color 2 science (LiColor2). The DXL2 builds on the success of the Millennium DXL and benefits from real-world experience and input gained from Panavision's partnership with cinematographers.

"The Millennium DXL2 8K camera system was conceived with the goal of maximum creative control from the moment of capture through delivery and display," says ASC associate Michael Cioni, senior vice president of innovation at Panavision and Light Iron.

Since its introduction in 2016, the DXL has been used on more than 20 features and an array of television series, commercials and music videos. John Schwartzman, ASC photographed two features with the DXL and is among those who have tested the DXL2, providing input that has guided the design. "When you take an 8K image and super-sample it, it only gets better," says Schwartzman. "It's absolutely beautiful to look at. For me, the Millennium DXL2 is a no-brainer. It's something I would use on anything. It does it all. And in fact, I'm currently planning to shoot my next feature with it."

The Monstro 8K VV sensor in the DXL2 offers 16-plus stops of dynamic range with improvements in image quality and shadow detail, a native ISO setting of 1,600, and ProRes 4K recording at up to 60 fps. Images are presented on the camera in log format using Light Iron's color science. An integrated PX-Pro color-spectrum filter custom-made for the DXL offers a significant increase in color separation and higher color precision to the image. Built-in Preston MDR, 24-volt power and expanded direct-to-edit features are also standard on the DXL2. An anamorphic flare attachment (AFA) offers a convenient, controllable method of introducing anamorphic-style flares with spherical lenses. Additionally, LiColor2 streamlines the 8K pipeline, smoothly handling the workflow and offering quick, convenient access to high-quality raw images.

"We are proud to provide an ecosystem of tools that gives filmmakers more choices to express their vision," says ASC associate Kim Snyder, Panavision's CEO and president. "We have been listening to feedback from cinematographers, and the results of our collaboration are directly manifested in the DXL2. We remain committed to continuous technological development and are excited to bring this new camera to market."

DXL2 cameras are available now to rent exclusively from Panavision on a worldwide basis.

For additional information, visit www.panavision.com/dxl.

Arri Launches Large-Format Alexa

Arri has unveiled a complete large-format system to meet modern production requirements. Based on a large-format 4K version of the Alexa sensor, the system comprises the Alexa LF camera, Arri Signature Prime lenses, LPL lens mount, and PL-to-LPL adapter. The system is also compatible with existing lenses, accessories and workflows.

Featuring a sensor slightly bigger than full frame, the Alexa LF camera records native 4K, allowing filmmakers to embrace a large-format aesthetic while retaining the Alexa sensor's colorimetry and proven suitability for HDR and WCG workflows. Recording formats include ProRes as well as uncompressed, unencrypted ArriRaw at up to 150 fps.

"The larger Alexa LF sensor has the same optimal pixel size as other Alexas, resulting in a 4448-by-3096 image," says ASC associate Marc Shipman-Mueller, Arri product manager for camera systems. "This doesn't just add definition, it creates a whole new look — one that is truly immersive, with a three-dimensional feel. The various recording formats and sensor modes make this look available to all productions and satisfy any possible deliverable requirement."

Accompanying the Alexa LF camera are 16 large-format Signature Prime lenses, ranging from 12mm to 280mm and outfitted with the Arri LPL mount. A fast T-stop of T1.8 facilitates images with a shallow depth of field, and the smooth focus falloff gives subjects heightened presence in the frame.

Thorsten Meywald, Arri product manager for optical systems,

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NEW Canon EOS C200 EF Cinema Camera
and 24-105mm Lens Kit

This kit from Canon includes the EOS C200 EF Cinema Camera and the Canon EF 24-105mm f/4L IS II USM Lens. This pairing creates a versatile digital cinema production kit. The camera is capable of capturing and recording DCI 4K internally as Canon's Cinema RAW Lite via a CFast 2.0 slot. Two built-in SD card slots enable recording 4K UHD and Full HD as MP4. The included accessories include a handgrip, 4" touch screen LCD viewfinder, which supports "Tap Focusing" and compliments the camera's built-in EVF.

CAC20024105 | $8,399.00

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comments, "The Arri Signature Prime lenses are incredibly lightweight and robust due to the magnesium lens barrels. They also feature LDS-2, Arri's next-generation Lens Data System. What has impressed cinematographers most, however, is the look. Skin tones are rendered beautifully and kindly, while all the detail of landscapes can be captured. Our focus was on the emotional impact of images, creating unique and pleasing bokeh both in the foreground and background."

Optimized for large-format sensors, the LPL lens mount has a wider diameter and shorter flange focal depth than the PL mount, allowing the Signature Primes and future large-format lenses to be small and lightweight, with a fast T-stop and pleasing bokeh. The LPL mount will also be available for other Arri cameras and is being licensed to third-party lens and camera manufacturers.

Full compatibility with existing PL-mount lenses and Alexa accessories is a cornerstone of the system's design. A PL-to-LPL adapter offers backwards compatibility with all PL-mount lenses, whether Super 35 or full frame. The adapter attaches securely to the LPL lens mount without tools, allowing crews to rapidly switch between PL and LPL lenses on set, and offering cinematographers a vast field of lenses from which to choose.

"As always, we want to make sure that our customers get the best possible return on their investments in Arri equipment," says Stephan Schenk, managing director of Arri Cine Technik. "Providing compatibility with existing lenses, camera accessories, workflows, Arri Look Files, lens metadata, and software tools makes it easier for crews to work with Alexa LF on set and for rental houses to incorporate it into their inventories."

At press time, the first Alexa LF cameras were scheduled to ship at the end of March, with the initial set of four Signature Prime lenses (35mm, 47mm, 75mm, and 125mm) slated to be shipped in early June. The remaining lenses will be available over the course of the year.

For additional information, visit www.arri.com/largeformat.

Arri Rental Opens Brooklyn Haus

Promising "crew hospitality" to the Brooklyn production community, Arri Rental has announced the opening of a satellite office to accommodate camera rentals, with space for prep, drop-offs and pickups. Located in Brooklyn's Greenpoint neighborhood, Arri Rental's Brooklyn Haus is situated near popular studio locations including Broadway Stages, Steiner Studios, Silvercup Studios and Kaufman Astoria Studios.

With meeting rooms, entertaining spaces and a café, the Brooklyn Haus can serve as a gathering place for production and crew. ASC associate Lisa Harp, president of Arri Rental U.S. Camera, says, "By opening Brooklyn Haus, we not only underline our long-term commitment to support New York's bustling production community and its members, but also create an inviting environment for networking, exchanging ideas and listening to customers."

The facility opening marks an auspicious start for Harp, who joined Arri Rental in November, following 27 years with Panavision. Arri Rental's headquarters, found in nearby Secaucus, N.J., will remain the center for the company's full spectrum of services for camera, lighting and grip needs. Arri Rental's exclusive offerings include Alexa 65 and Alexa XT B+W cameras.

"Having a presence in New York City will bring day-to-day efficiencies for our clients," adds ASC associate Martin Cayzer, Arri Rental's chief executive, "and, just as importantly, give them a sense of who we are and what we stand for by providing a [home away from home] in this vibrant, creative and exciting borough. That and great coffee, of course."

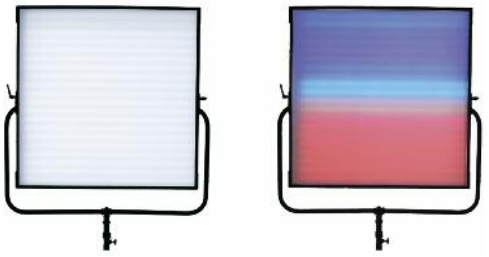
Arri Rental Brooklyn Haus, 236 Greenpoint Avenue, Building Six, Brooklyn, N.Y. 11222. For more information, visit www.arrirentalgroup.com.

NBCUniversal Wields LightBlade

Launched last year, NBCUniversal's LightBlade family of LED units recently expanded with the addition of 1 Blade, 2 Blade and 4 Blade configurations. These new products join the popular LB1K and Ladder Light.

The basic NBCUniversal LightBlade module is a linear 4' fixture that can be used individually or combined to build lighting fixtures tailored for any soft-light application. Each LightBlade produces up to 8,000 lumens of high-CRI white light, tunable

LightBlade LB1K



from 2,700K to 6,500K. The white-light output can be blended with the built-in high-output RGB saturated color engine, providing nearly unlimited lighting-control possibilities. Lighting professionals can selectively layer saturated color on top of white light to create different shades, tints and tones without sacrificing the white-light quality critical for production and broadcast lighting. Each LightBlade is powered by 24-volt DC and controllable via four channels of DMX/RDM.

LightBlade Ladder

NBCUniversal LightBlade LED has been quickly adopted by feature, series and commercial productions across North America. The lightweight, 1.5"x48", 50-watt light engines are silent and flicker-free, and are built to endure the wear and tear of staging and production.

NBCUniversal LightBlade LED is available for rental and sales. For more information, visit www.lightbladeled.com.

SmallHD, Teradek Partner for Director's Monitor

Marking the first collaboration between Vitec Group companies SmallHD and Teradek, the 703 Bolt Wireless Director's Monitor provides live review of full 1920x1080p at up to 300' when used with compatible Teradek Bolt 500, 1000 or 3000 transmitters. With previews and playback as well as stereo audio headphone output, the 3,000-nit, daylight-viewable display is the brightest monitor SmallHD has so far made.

Capable of two input sources for simultaneous A/B camera monitoring, the 703 Bolt Wireless Director's Monitor can be powered by a single Gold or V-mount battery, with a 90 watt-hour battery providing more than four hours of viewing and signal reception. Built from a milled-aluminum frame with a durable Gorilla Glass screen, the 703 Bolt system measures 8.4"x4.8"x1.21" without antennas, and weighs 4.35 pounds with battery and handles, the latter of which are contoured with an ergonomic rubberized coating. If a wired configuration is preferred, the monitor can run two SDI inputs simultaneously, or as an SDI input and an SDI output.

The 703 Bolt Wireless Director's Monitor is delivered with SmallHD's latest OS3 operating system, which incorporates

features for color synchronization, spot metering and auto-calibration, including custom false color, improved battery meter and computer-free integration with the optional SmallHD Color Probe.

SmallHD CEO Wes Phillips explains that OS3 enables users to "calibrate their on-camera and production monitors without using a computer. We've added the capability to create up to 10 customizable IRE ranges and assign specific colors to the ranges. It allows the user to choose what's important in the exposure, and identify problem areas faster than ever."

The 703 Bolt is available on its own or in a Director's Kit, which bundles the monitor with handles, neck strap, battery bracket, and both matte and transparent screen protectors.

For additional information, visit www.smallhd.com and www.teradek.com.

➢

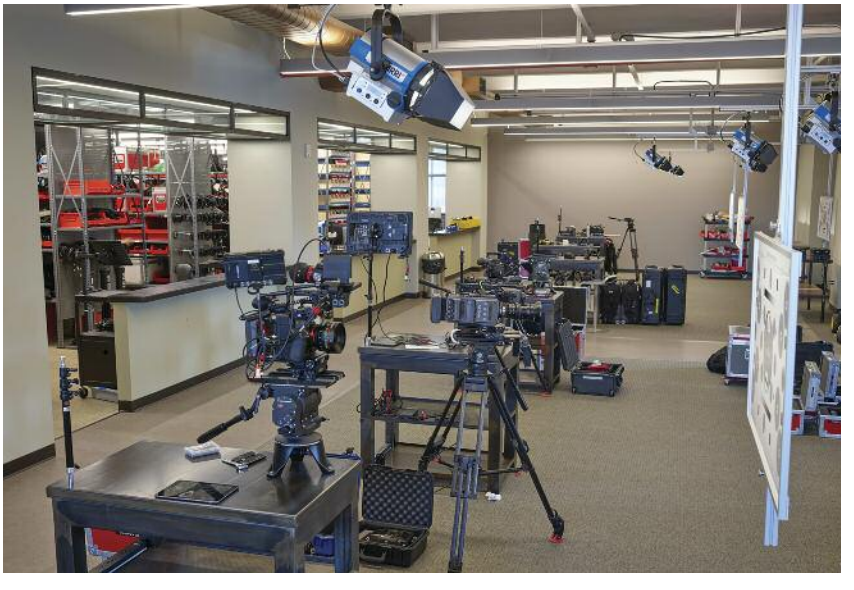
Industry City Welcomes AbelCine

AbelCine, a supplier of products and services to the broadcast and media industries, has relocated its Manhattan operation, including more than 85 employees, into a new 44,000-square-foot facility in the Industry City business park in Brooklyn. The move was planned and overseen by ASC associate member Rich Abel, AbelCine's co-founder and COO, with Liz McGill, AbelCine's creative director. The result is a reimagined physical location where creatives can work and interact while gaining seamless access to gear, support and education.

The move to Industry City provides productions with a 107-seat training theater that has been equipped with 4K projection, a 15' screen, 7.1 surround sound, and multi-camera live-switch/livestream capabilities. The large, open, interactive showroom incorporates sales, rentals, tech services and training, each easily accessible from a central floor. There are also spacious rental checkout bays with amenities for small to large productions alongside state-of-the-art maintenance and service centers for cameras, lenses and ancillaries.

"At AbelCine, we support filmmakers and content producers in all their creative and business endeavors," says Abel. "We do this by offering a range of services focused on gear, support and learning. This combination of technology, innovation and creativity is also central to Industry City. With a healthy mix of artists, designers, media producers and makers, we immediately recognized that I.C. was our natural home."

Constructed on the waterfront in Brooklyn's Sunset Park neighborhood, Industry City is home to 16 separate but interconnected buildings for creative, commercial and industrial businesses. "AbelCine is a key component to the film and media ecosystem that continues to grow at Industry City," adds Industry City CEO Andrew Kimball. "The company's commitment to the industry through innovation and ongoing education fit well with



the ethos of the vibrant Industry City campus."

The interior and exterior of the AbelCine HQ features several collaborations with local artisans who have repurposed materials from past Industry City warehouses. In addition to a lounge and community area,

the new AbelCine site has an engineering lab with machine room for product development, prototypes, and manufacturing needs. An integration area is also provided for the building and staging of broadcast, livestream and studio solutions. Finally, multipurpose rooms are available for custom training or technical consultations.

AbelCine NY, 88 35th Street, Industry City, Brooklyn, N.Y., 11232. For more information, visit www.abelcine.com. ➢

DJI Stabilizes handheld Systems

DJI has unveiled two new stabilization systems, the Osmo Mobile 2 and Ronin-S, each of which has been built to bring smooth and steady panning and tracking to handheld video capture.

"With the introduction of these two stabilizers, DJI now offers gimbal technology to help unlock the creative storyteller in everyone, no matter what camera they're using," says Paul Pan, senior product manager at DJI. "Osmo Mobile 2 offers the best in smartphone stabilization at an affordable price, and Ronin-S brings the quality of DJI's professional gimbal technology to a new form factor that is perfect for run-and-gun filming using your favorite DSLR or mirrorless camera system."

With manual focusing options, the Ronin-S is the company's first single-handed stabilizer for the DSLR and mirrorless markets. The SmoothTrack handle technology offers a simplified button and joystick interface to control the camera and gimbal as well as operations. With three-axis gimbaling, there are high-torque motors that support both in-camera and in-lens optical stabilization from systems such as Canon's EOS 5D, Panasonic's GH and Sony's Alpha cameras.

Axis locks and an ergonomic, curved design reduce shake during complex movements. The stabilization system also compensates for zoom lenses, even those with higher magnification ratios and external zooming barrels. In addition to Sport mode for tight tracking of quickly moving subjects, a Push mode allows users to manipulate the pan-and-tilt axis by hand. DJI's intelligent batteries can be hot-swapped in the Ronin-S during operation. SmoothTrack settings can be directly customized with dedicated responsiveness on each axis.

The Ronin-S is compatible with a variety of accessories already available for professional DJI products, including a Focus Control Center with focusing dial and screen, allowing advanced gimbal and focus without a mobile device. It also comes with a vehicle-mount solution, DJI Master Force, DJI Master Wheels, an external focus motor, and a cheese plate adapter for third-party accessories. A dual-handle support will be produced for the Ronin-S, too.

The Osmo Mobile 2 is a handheld stabilizer for smartphones with an adjustable two-way mobile clamp that can pivot between landscape and portrait orientation. Constructed of high-strength modified nylon, the Osmo Mobile 2 is compact and foldable.

The three-axis Osmo Mobile 2 gimbal works in concert with the same SmoothTrack technology to detect and compensate for camera movements. The ¼" screw will secure accessories including lights or microphones, and a USB port has been incorporated to enable charge during capture and serve as a power bank for smaller electronics. A zoom slider has been added that can simulate a dolly effect, and the battery offers up to 15 hours of runtime.

The free DJI Go application offers modes including ActiveTrack, which automatically follows moving subjects; Motion Timelapse, for up to five different camera positions; and Hyperlapse, to create timelapse videos while the camera is in motion. The app can also livestream to Facebook, YouTube and other popular social platforms.

For additional information, visit www.dji.com.

Hawk-Woods Packs Power

With U.S. distribution through Manios Digital & Film, broadcast-solutions provider Hawk-Woods has announced flight-safe, ultra-small and lightweight Mini V-Lok batteries.

The Mini V-Lok is available in two sizes: 100 watt-hour and 150 watt-hour, the latter of which includes two D-Tap outlets. When used in tandem with an optional adaptor, the Mini V-Lok will extend capacity up to 300 watt hours. Hawk-Woods also introduced the VL-MCF1 — and VL-MCF2 for Red users — hot-swappable battery mount for the Mini V-Lok; the

dual-mount plate has intelligent LED sensors to monitor battery status, and houses two D-Taps.

The Mini V-Lok "packs a lot of power-into a small footprint," says ASC associate Steven Manios Jr., president of Manios Digital & Film. "Hawk-Woods Mini V-Lok eliminates the need to swap out batteries every hour without adding undo extra weight.

"Either battery can be swapped out without having to power down, so you never run out of power," continues Manios Jr. "It works like stackable batteries except that you don't have to carry around the extra weight of a dead battery."

An authorized distributor for Hawk-Woods — as well as Cartoni, Vocas, Kinotehnik, and Veydra — Manios Digital & Film has an extensive relationship nationwide with dealers and manufacturers. "These batteries are an ideal choice for lightweight configurations, and they conform to air-transport restrictions," adds Cartoni France CEP Régis Prosper.

For additional information, visit www.hawkwoods.co.uk and www.maniosdigital.com.

Miller Aims True With CompassX

Camera-support solutions provider Miller has announced the CompassX series of fluid heads. Designed for speed, balance and strength, the CompassX series currently comprises five models: CX2, CX6, CX8, CX10 and CX18.

The CX fluid heads incorporate Miller's CB Plus technology, which takes traditional counterbalancing a step forward. All five models feature 16 positions of counterbalance for fine, rapid adjustment, and the side-loading base plate enables fast and easy mounting of camera rigs. The wide

payload range of the CompassX series provides flexibility when switching cameras or adding accessories. Its robust construction promises a long, low-maintenance service-life and low cost of ownership.

The CX2 and CX6 boast a payload range of 0-8kg (0-17.6 pounds) and 0-12kg (0-26.4 pounds), respectively, with "3+0" pan-and-tilt drag positions and a 75mm ball-leveling mounting base for lighter rigs where portability is important. Where more fluid drag is required, the CX8 and CX10 both support 5+0 drag positions, a 0-12kg payload range, and a 75mm and 100mm ball-leveling mounting base, respectively. The models top out with the CX18, which features a 0-16kg (0-35.2 pounds) range, 5+0 pan-and-tilt drag positions, and a 100mm ball-leveling mounting base.

For additional information, visit www.millertripods.com.

Rokinon Offers Wide Angle

Following on the heels of the company's 35mm (f1.4) full-frame lens for Sony E mount, Rokinon has released the 14mm (f2.8) — the company's first AF lens to be available for Canon EF.

With a seven-blade aperture and 116.6-degree angle of view, the lens holds 15 elements in 10 groups, including one Extra-Low Dispersion, two Aspherical, and four High-Refractive Index lens elements. Ultra Multi-Coating anti-reflective coatings further minimize aberration. The lens construction includes an all-metal housing and Manual/AF switch. Though it is full-frame, the EF-mount lens is compatible with Canon EF-S Super 35-sized APS-C sensors at approximately 22.4mm (depending on sensor) for an equivalent angle of view of 92.8

degrees in 35mm.

The lens has a minimum focusing distance of 7.8" and a magnification ratio of x0.15. As an ultra-wide prime, there is no filter thread, and lens petals are affixed. The compact 14mm lens measures 3.8" long with a weight of 17.1 ounces (485 grams).

Rokinon lenses are produced by Korean lens company Samyang Optics. Samyang offers several similar focal lengths under their own brand, including a line of Cine Lenses with de-clicked apertures for Sony, Canon, Nikon and Micro Four Thirds mounts.

For additional information, visit www.rokinon.com.

Manfrotto Expands Nitrotech Range

With variable fluidity adjustment for both pan and tilt, Manfrotto's Nitrotech fluid video heads boast a continuous counterbalance system that can be precisely

aligned thanks to 55mm of camera-plate travel. The previously released Nitrotech N8 head supports up to 17.6 pounds for use on tripods, cranes or slider rigs; Manfrotto's new Nitrotech N12 supports rigs from 8.8 pounds up to 26.4 pounds.

To keep the weight of peripherals off of cameras, Nitrotech heads feature a ⅜" Easy Link connection with a fast anti-rotation lockdown switch for adding external monitors or other accessories such as flags or lights.

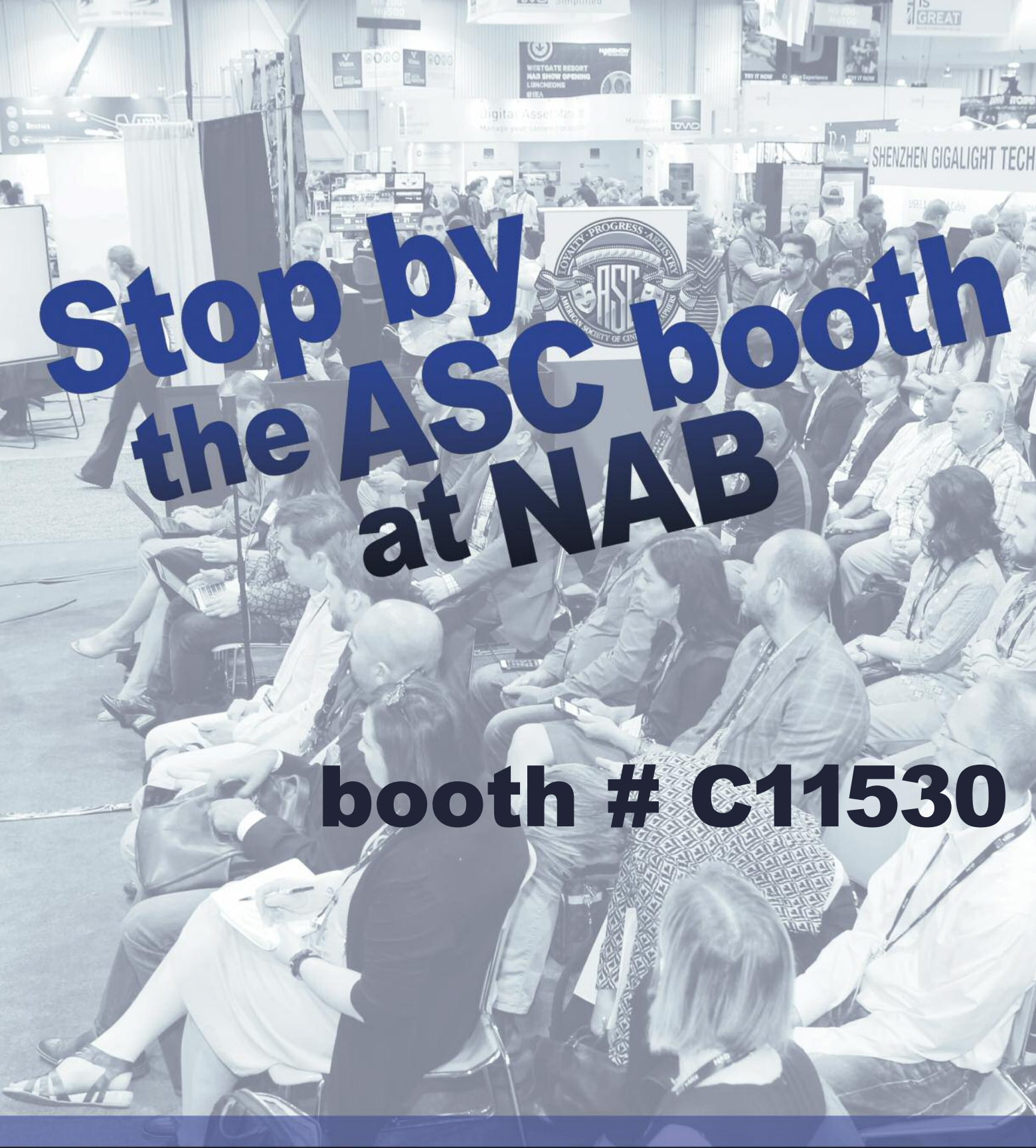
Building on the design of the Nitrotech N8, the $599 Nitrotech N12 adds a side knob for adjusting the counterbalance. Bumping up to $1,099, the Nitrotech N12 is available with the two-stage aluminum 545GB tripod, which includes a ground spreader, or the 545B tripod, with mid-level spreader; each tripod offers a height range of 11"-60" and weighs only 8 pounds with a payload capacity of up to 55 pounds. An included flat-base-to-half-bowl adapter allows the 75mm flat-base head to be used with the 100mm bowl on both tripods.

The Nitrotech N12 with 536 carbon-fiber tripod is available at $1,479. The three-stage 536 tripod does not incorporate a spreader and offers a height range of 10"-80" and weighs only 7 pounds while offering a 55-pound payload capacity.

Manfrotto's Nitrotech N8 is also available in multiple configurations, including with the 546GB or 546B aluminum tripod, or the 535 carbon-fiber legs.

The Nitrotech fluid heads are also compatible with several Manfrotto dolly and slider systems.

For additional information, visit www.manfrotto.us. ●



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CLUBHOUSE NEWS

Clockwise from top left: Lois Burwell with John Bailey, ASC; associate member Bill Russell; associate member Denny Clairmont.

Bailey, Clairmont Honored at SOC Awards

The Society of Camera Operators (SOC) recently held their Lifetime Achievement Awards at the Loews Hollywood Hotel. **John Bailey, ASC** was presented with the Governors Award, and ASC associate member **Denny Clairmont** received the Distinguished Service Award. Actress Meryl Streep received the Presidents Award. Lifetime Achievement Awards were also presented to camera operator P. Scott Sakamoto, SOC; mobile camera platform operator Dan Pershing; camera technician John Connor; and still photographer JoJo Whilden, SMPSP.

Russell Named VP Sales, Sim Camera U.S.

ASC associate member **Bill Russell** was recently appointed vice president of sales at Sim Camera U.S. In this new position, Russell is charged with establishing and maintaining relationships with Sim clients in the U.S. market, and will oversee business development activities for the company's Los Angeles and Atlanta camera operations. Russell previously served as vice president of camera products for Arri, and ran a consulting business for entrepreneurs seeking to enter or improve their position in the motion-picture industry.

"I am very happy to be part of this growing and dynamic team," says Russell. "Sim is uniquely positioned to provide first-rate service in camera rentals and world-class post facilities across the market. The combination of these linked services under one roof gives our customers in production and post the partner they need."

Russell is based in Los Angeles.

Camerimage Presents Winners Show

The Camerimage International Film Festival, in partnership with the ASC and the American Film Institute Conservatory's cinematography discipline, recently held its eighth annual Winners Show at the AFI campus in Los Angeles. The show brings selected prizewinning films from the Polish festival to Los Angeles. Among the projects screened were *The Art of Loving*, shot by Michal Sobocinski, PSC ("Rising Stars of Cinematography," *AC* Feb. '18); ASC Spotlight Award nominee *Loveless*, shot by Mikhail Krichman, RGC; and ASC Spotlight Award nominee *On Body and Soul*, shot by Máté Herbai, HSC.

AC at Sundance

American Cinematographer made large footprints in the snow at the 2018 Sundance Film Festival, serving as the media partner of Canon, the festival's official camera sponsor, while co-hosting two major parties for filmmakers.

On January 21, the magazine helped Canon welcome a capacity crowd of filmmakers and their guests at the Canon Creative Studio, the company's official festival headquarters on Main Street, where the company celebrated cinematographers with its annual "Raise Your Glass to Cinematography" party. ASC president Kees van Oostrum and fellow Society members Steven Shaw and Nancy Schreiber were among the many industry professionals who attended the event, where guests mingled while keeping an eye on the NFL's NFC Championship Game.

As part of the media partnership with Canon, the magazine also helped present a series of six panel discussions moderated by veteran contributors Jay Holben and Pat Thomson and streamed live on the *AC* Facebook page (facebook.com/AmericanCinematographer). Complete details — as well as additional coverage of select Sundance projects — can be found on the magazine's website (ascmag.com/articles/canon-creative-studio-at-sundance-2018).

"Our inaugural partnership with Canon was extremely successful, spotlighting the kind of filmmaker and educational outreach both of our organizations offer to

Photo of Clubhouse by Isidore Mankofsky, ASC; lighting by Donald M. Morgan, ASC. SOC Awards photos by Albert L. Ortega.

the industry," says Stephen Pizzello, *AC* editor-in-chief and publisher. "We're very grateful to our friends at Canon and its media-relations firm, Sunshine Sachs, for inviting us to join forces."

On January 20, for the third successive year, *AC* co-hosted its "Park City Beer 'n' Brats" reception for filmmakers along with sponsors TCS New York, CW Sonderoptic/Leica Cine, Camadeus Film Technologies and the International Collective of Female Cinematographers (ICFC). The invitation-only party attracted several hundred cinematographers and industry pros who enjoyed a full bar and catered, alpine-themed food in a luxurious venue with spectacular mountain views.

"The magazine deeply appreciates the stalwart and extremely generous support provided by Erik and Oliver Schietinger of TCS, Seth Emmons and Rainer Hercher of CW Sonderoptic, and Sebastian Lumme of Camadeus, whose enthusiasm and extraordinary attention to detail have helped our annual reception attain 'hot ticket' status," says Pizzello. "We were also happy to share the day with our friends from the ICFC, who turned out in force to help us celebrate the kind of inclusive artistry that *American Cinematographer* and the ASC emphatically support." ●

1. AC contributor Pat Thomson leads a discussion at Canon's Sundance headquarters. 2. ASC associate Jay Holben (far right) moderates a talk with (from left) Brent Barbano, Yamit Shimonovitz and Martina Radwan. 3. Thomson (far right) with (from left) Greta Zozula, Claudia Raschke and Autumn Eakin. 4. ASC President Kees van Oostrum with filmmaker Dan Kneece at Canon's "Raise Your Glass to Cinematography" party. 5. ASC members Steven Shaw and Nancy Schreiber at the Canon party. 6. Halyna Hutchins and Drew Levin at the "Park City Beer 'n' Brats" party. 7. Erik Schietinger of TCS New York, Seth Emmons of CW Sonderoptic and Sebastian Lumme of Camadeus Film Technologies pose with Meg Kettell at the Park City party. 8. ICFC members.

Sundance/Park City photos by Seth Emmons, Andrew Fish, Rainer Hercher and Danna Kinsky.

CLOSE-UP

Alik Sakharov, ASC

When you were a child, what film made the strongest impression on you?
Aleksandr Dovzhenko's silent film *Earth*, and Andrei Tarkovsky's film *The Mirror*.

Which cinematographers, past or present, do you most admire?
Danilo Demutsky, from Ukraine; Sergey Urusevsky, from Russia; and Gordon Willis, ASC, from the USA.

What sparked your interest in photography?
Black-and-white images in general. Taking pictures at an early age — 11 or 12. Processing the film and printing pictures in the darkroom. The whole process was akin to magic. It hooked me immediately. Many years later, I am still under its powerful grip.

Where did you train and/or study?
I have no formal higher education in photography or cinema. As a boy, from 11 to 13, I attended an afterschool photo program in Moscow's House of Culture in the Krasnopresnenskaya district.

Who were your early teachers or mentors?
The instructors in the photo program at the House of Culture — I don't remember their names.

What are some of your key artistic influences?
The films of Andrei Tarkovsky, Aleksandr Dovzhenko, Ingmar Bergman, Michelangelo Antonioni and Stanley Kubrick.

How did you get your first break in the business?
In the Eighties I did a lot of industrials, eventually progressing to shooting music videos, commercials, and then films — low-budget films, that is. After that, things started really 'snowballing' into the career of a real cinematographer. After five or six features, I ended up shooting the pilot of *The Sopranos*, and on and on it went.

What has been your most satisfying moment on a project?
There is not one moment — there are moments! Many moments on many projects can at times bring tremendous satisfaction. It all depends.

Have you made any memorable blunders?
Who does not? I'm sure I have.

What is the best professional advice you've ever received?
Want to be somebody? Don't think too much. Just get out there and start doing it. If you have something worthy to bring to the table, people *will* notice.

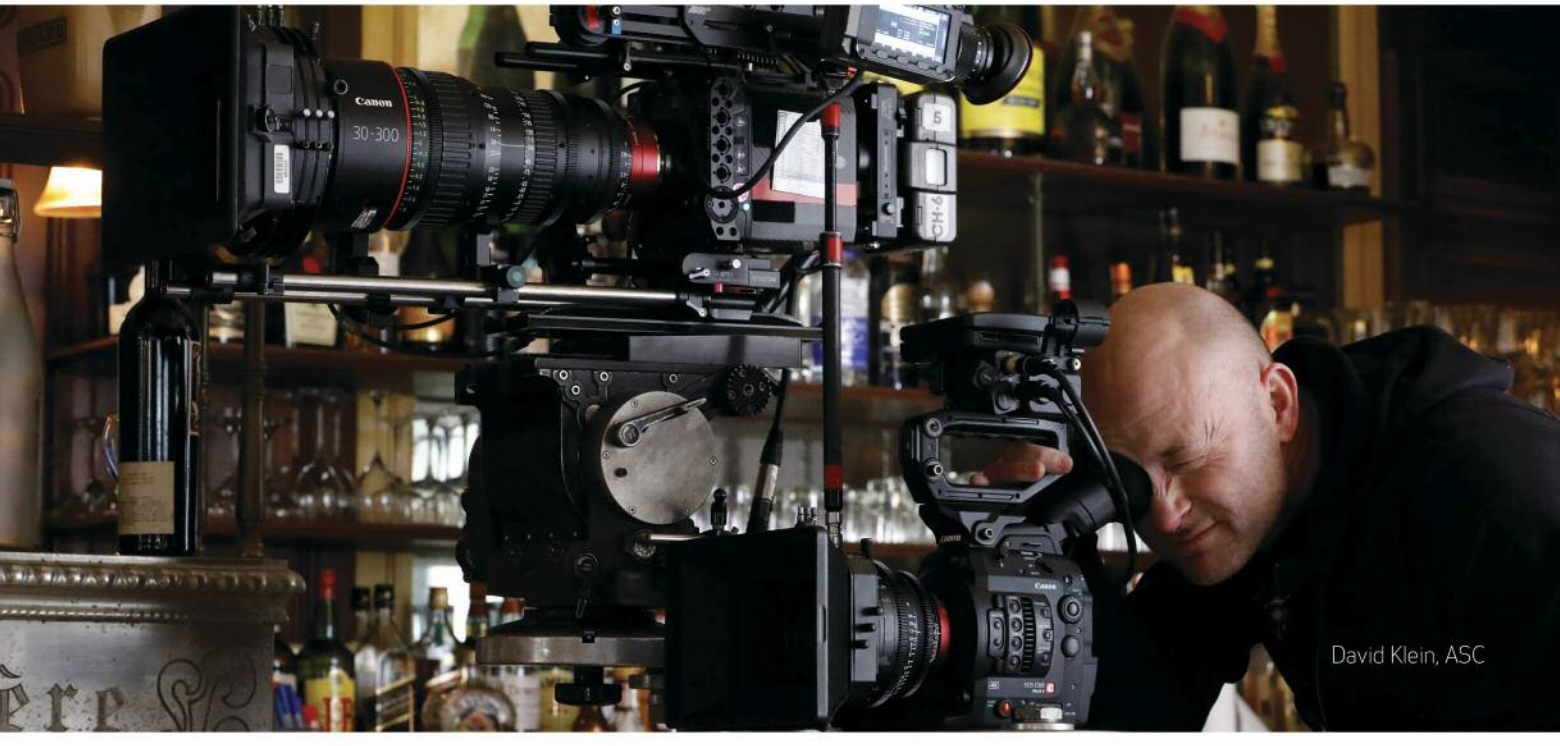
What recent books, films or artworks have inspired you?
This is a truly continuous process. It's not really books, films or artworks — it is mostly people who inspire me. Chief among them are Andrei Tarkovsky, Yuri Norstein, Eduard Nazarov, Ingmar Bergman, Stanley Kubrick and Michelangelo Antonioni.

Do you have any favorite genres, or genres you would like to try?
Poetic cinema.

If you weren't a cinematographer, what might you be doing instead?
I am doing it already, and that is directing.

Which ASC cinematographers recommended you for membership?
The late Harris Savides was my main sponsor, along with Sol Negrin and Julio Macat.

How has ASC membership impacted your life and career?
It made/makes one matter. Still does. ●



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