



John Brawley, ASC on *The Desperate Hour* with Blackmagic URSA Mini Pro 12K cameras.

*The Desperate Hour* is one of the first features where a Blackmagic URSA Mini Pro 12K was the “A” camera. Actually, there were four URSA 12K cameras on the film. Cinematographer John Brawley, ACS discusses cameras, lenses, lighting, equipment and more.

**Jon Fauer: Please tell us about the backstory of your work as DP on *The Desperate Hour*.**

John Brawley, ACS: Our location was in Northern Ontario, Canada. It was during the height of COVID. They had just established the first return-to-work COVID rules, it seemed like a good film at the time to do, because there was only one main actor and it was in a rather remote part of Canada. We were also outside. It was a small crew. I have to confess that I spent longer in quarantine than I did filming the entire movie. We did the movie in just 13 days after I was in quarantine for 14 days.

It’s a proper indie film. I think Phillip Noyce, the director, wanted to do it, and Naomi Watts was committed as well. We all just wanted to go back to work, and it seemed like the right project at the right time. But it was my first COVID protocol movie, when we were working out all the things we take for granted now in terms of COVID safe working conditions. It’s deceptive, because when you first read the script, it seemed like, “How hard can it be, it’s mostly just one actor.”

**Probably very hard.**

Yes, it was really hard, because to figure out how to shoot drama scenes at the level of performance that she had to do running, and even just from an acting point of view, that’s really hard to do, to not be out of breath or seem out of breath enough that you’re acting out of breath, but still have a performance that reads to the audience, to be able to do that performance, is incredibly difficult.

And then, if you start thinking about the logistics, because it’s a near real-time movie, how on earth are you going to make video village work over a huge distance in the forest with a moving set? Naomi spent her quarantine training, distance running every day and she started getting some very fast times. She was the only one who actually was really fit. The rest of us were slovenly in comparison. She was running a lot, trying to get her stamina up, and she was also in quarantine. She had a treadmill on location, and she was running every day to stay in shape and be able to do the work.

None of us crew did, of course, and she showed us up very quickly. I had to do a couple of scenes where I was hand-held running, jogging backward with her, and I was knackered. I’d lasted two and a half takes of one of them, and then I couldn’t do it anymore; my legs were so tired. And I literally had to go and have physical therapy, because I just wasn’t prepared. That was



Naomi Watts in *The Desperate Hour*. Photo: Sabrina Lantos. Courtesy of Vertical Entertainment and Roadside Attractions.

my own silly fault. Sometimes I had grips running alongside with bounce boards, and they would only last a take and then they'd have to swap out. And she would move back and do another take. She really showed us all up in a humiliating way.

### **Now it's time to tell us about the camera, please.**

It was the Blackmagic URSA Mini Pro 12K. Actually, four of them. I thought the 12K could be good because it was a daylight film, I knew we wanted a small camera, I thought the extra resolution would help with stabilizing, and I'd already shot a pilot with Phillip where we used the previous Blackmagic URSA G2 4.6K cameras, to do the whole pilot as an A camera. I knew he wasn't afraid of trying something out like that, but I did test it in advance.

We made a DCP and screened it in the local cinema in North Bay, the little village where we worked. I love doing these as blind tests, and everyone liked the 12K very much. Because the budget we had was so modest, we would only have been able to afford one traditional camera package and a set of lenses. However, with the URSA 12K, we could get four camera bodies basically for the same price. So, we had a hero A-camera body that could live on the head, a B camera that was rigged in studio mode with an Optimo 24-290. A third camera was there for a splinter crew to go do inserts with doubles. Phillip generates a lot of insert coverage

as he goes. That gave us a lot more flexibility than having just the one camera. And the fourth camera was there as backup. I also had an early prototype of the RAWLITE OLPF.

The 12K resolution was a plus because we knew that sometimes we were probably going to have to stabilize a shot, even with a stabilized head. The other cool thing is that the 12K camera can work in 8K mode without losing any field of view, no crop. An advantage is that the rolling shutter read-out time is halved. I'd have to check the numbers, but in 12K it's about 15 milliseconds, and in 8K it's half that, about 7 to 8 milliseconds. For intense action scenes, especially if we're in profile or panning through trees, the rolling shutter in 8K mode helped to eliminate skewing of the verticals. If we were leading ahead of Naomi from the back of the e-bike, we'd leave it on 12K, but if it was profile, panning, we'd go to 8K.

### **What codecs/compression settings did you use?**

I used the Blackmagic RAW Constant Quality "Q" settings compressions. As you know, the camera offers Constant Bitrate (5:1, 8:1, 12:1 and 18:1) and Constant Quality, which is a variable bitrate that maintains the same image quality (Q0, Q1, Q3, and Q5).

I recorded most of it at Q3 because Q3 at 12K is about a terabyte



URSA Mini Pro 12K with ZEISS Supreme Prime, Cine Tape, Wooden Camera D-Box, Anton Bauer battery.

an hour. (If you shoot ARRIRAW on an ALEXA Mini Super 35, it's also about a terabyte an hour.) Q3 looks fantastic.

It sounds more confusing than it actually is. In Constant Quality, the bit rate floats, with a bracket between low and high. Blackmagic compression is interesting. It's not based on motion; it's based on what's in focus. So, if something is out of focus, it uses less data, and if it's in focus it uses more data. So it's not based on what's moving, it's based on the sharpness of the image, essentially. If you have a wide shot at T8 on Q3, it's going to use the upper end of that band or data rate, and if you had close-up of someone at T2 with their face taking up 30% of the frame, and the rest of it was an out-of-focus, beautiful background, it will use a lot less data. It was interesting to realize and work that out. But I never really felt like I ran into the wall with the compression itself.

**What would be the difference in data rates and recording times? You said Q3 gave you about a terabyte for an hour?**

If you were to use fixed, 3:1 Constant Bitrate, it's around 3 or 4 terabytes an hour. In theory, Q1 with a very detailed scene, consumes even more. But most of the time, in practice, some stuff's in focus and some isn't, so usually a lot less actually. The Q rates are interesting because I find that you really can't see

much of a difference because of how efficiently it compresses. I'm amazed at how Q3 looks.

**The colors were beautiful.**

It is unique the way the sensor works. That was another reason I thought it would probably be a good match. We were shooting in the fall, also known as autumn if you're an Australian, and we knew the colors in the forest would be a big part of it. The production design was largely location choices, and it was also very much a character as well. We were really careful about choosing the right locations at being there at the right time of day when the light looked good, and so we had a camera that could do that nuance and subtlety justice, because there are some beautiful autumnal colors in that forest.

The vibrancy of the colors offers an extra layer of texture.. Especially when you're grading, it feels like you see a lot more subtlety. When you're looking at Naomi's face, you can see the sky color reflected in her forehead.

**What LUT were you using?**

I just used the default in-camera Extended Video LUT. It carried through to post at Technicolor.



Pocket Cinema Camera 6K Pro with Canon 24-105 mm f/4L IS II USM.



ARRI SXU wireless iris control unit powered with Wooden Camera D-Box.

## Were you shooting at 24 fps?

Yes. 24 fps, Q3, 12K and 8K, with a full set of ZEISS Supremes and Angénieux Optimo 12x 24-290. Also, we had another camera that hadn't been announced yet, the new Pocket 6K Pro. I had a pre-release version. There are inserts of Naomi holding her phone and most of those were taken with the 6K Pro using a Canon 24-105 mm image stabilized lens. The image stabilizer is pretty good and I would just run along behind her, handholding the camera, and trying to shoot the phone for those inserts.

## Even at 24 fps and lots of running, it was smooth, not jittery.

With Naomi running and moving up and down in the frame, we would just back her off a little bit and frame a bit looser. We composed for an aspect ratio of 2.39:1 and recorded the full 17:9 image area so we had extra room at top and bottom to reposition in post if needed.

## Were you riding exposure on the URSA 12K as you were traveling along?

Yes. I had a separate ARRI SXU wireless iris control unit. We powered everything on the camera with a Wooden Camera D-Box. It provides lots of accessory connectors and also remote start-stop for the camera.

## You mentioned Supremes?

When I first got the URSA 12K, I thought, "Well, I guess I need a really good lens set." The Supremes had only been recently announced. I didn't ask for them specifically but CVP had a demo set and they suggested I might like to try them. When I shot with them, I think I attributed half of the beauty of the footage to the URSA 12K camera and also as much to the lenses; they're just very nice looking.

On the URSA 12K, I find they have a very interesting look. The Supremes look beautiful on other cameras as well. The show I'm doing now is a Renée Zellweger limited crime series called *The Thing About Pam*, and I tested the Supremes.

Compared with other lenses at the same aperture, same focal length, the Supremes seem to fall-off faster. You can see that the bokeh and the focus fall-off are vastly different. And that's when I felt that the URSA 12K had a kind of large format look, even though it's a Super35 camera.

**Could it be a result of the 12K sensor, with its 12,288 x 6,480 photosites in an area that measures 27.033 mm wide x 14.246 mm high? The pixel pitch is approximately 2.2 microns. If we multiply by 3, as Leica's optical designer Peter Karbe suggested, that gives us a tiny circle of confusion (CoC) of 6.6 microns compared to the previously accepted 20 to 25 micron CoC of many other cameras. That might contribute to the shallower perceived depth of field as well as the famously gentle focus fall-off the Supremes.**

Could be! I'm almost wary of talking about a large format "look" but they are very special. I bought Supremes from CVP after I did that initial 12K test because I like the lenses so much and I appreciate that they're quite small. They're quite fast at T1.5 and not that expensive for high-end lenses. They're quite affordable. It's such an interesting market where lenses are going at the moment.

## Do you usually buy your equipment from CVP?

They're in the UK and I was filming *The Great* there at the time. We rented through ARRI and they did a great job looking after us. They just didn't have any Supreme Primes at the time because it was so busy. So, there's a fellow Australian at CVP named Aaron George. I know him from when he was an AC and then camera technician at Panavision Australia. Then he moved to London as head of camera service for ARRI in the UK. For the past 4 years or more, he's been at CVP and runs the Creative Space in Fitzrovia. During prep, we caught up with Aaron. I think we were having lunch together, discussing lenses, and he said, "Just tell me and I'll arrange for whatever lenses you'd like to test."

**Aaron is among the nicest and most helpful people in the business.**



URSA Mini Pro 12K with Angénieux 12x 24-290 zoom, Duclos handle, ARRI ZMU zoom control, OConnor 2575, Cine Tape.

He is. Anyway, Aaron got me a set of Supremes to test, and I liked them so much I ended up buying some.

I also bought an SRH-3 ARRI Stabilized Remote Head from Camadeus. I had used a Ronin 2 with Master Wheels as a low cost and tiny, great, stabilized remote head. But, and then COVID happened and then everyone went nuts for remote heads because of the new protocols around reducing the number of people near the talent. The beauty of the ARRI SRH-3 is that it is so durable and the motors are so strong that I've had a full-size Alexa SXT with a 24-290 zoom on it!. But it's still a really small head. It does not really require a tech. I used the head a lot on *The Desperate Hour*. I love that it's such a small head, but so powerful in terms of what you can do with it.

I've always wanted to own an ARRI geared head. One of the first things I bought when I became a freelancer was a CP Mini-Worrall because I wanted to learn how to use wheels, because I couldn't afford an ARRI head.

You can put the SRH-3 stabilized head on a dolly. It's not that fussy, you don't need dance floor or tracks as often. You can do more intricate moves and it's very liberating. On "The Desperate Hour" as you know, the Naomi Watts character runs during

most of the movie. There were a lot of conversations about how do you shoot drama scenes where someone's on the phone, acting, talking, running, and you're never editorially leaving the conversation. Naomi is very super-fit, and these were ten-hour days, but she's not running the whole ten hours. You're only going to have a few takes before you exhaust her. The SRH-3 became an important tool for us.

We did a lot of it with the SRH-3 remote head mounted on a Flowcine Black Arm, or a custom-made vibration-isolating arm from William F. White in Toronto, on the back of a Grip Trix electric vehicle and an e-bike. We had a very good bike rider, who is a former motocross champion. He said it was a challenge because Naomi could run quite fast. But sometimes she was running just slow enough that the bike became top heavy with the head arm arm on it, was right on the edge of like stalling and would want to fall over.

The progression of the story starts off in an urban environment; she's on the road, then on an asphalt-like a bike path, then on tracks that are more like dirt roads, and then it just gets more and more wild. It was easy on the paved and dirt roads, but then it starts getting really complicated on the hiking trails that are only less than a foot wide and you're kind of weaving between trees.



URSA Mini Pro 12K with ZEISS Supreme Prime on ARRI SRH-3 Remote Head.

The bike was really good for that. Probably 70% of the movie was done with the ARRI SRH-3 remote head and the rest was with long lenses on tripods at the side of the tracks and quite a few setups that I did hand held as well.

### **What were the logistics of video village and so on?**

When you think about how the logistics worked, Phillip wanted to be able to talk to her, he wanted to be able to see an image, so how can that work when you're on a bike? How do you make the whole video village circus happen, and how do you do it in a way when you have a limited budget and a limited schedule? Those were the big issues for us.

The locations became really important to us. For a while I was toying with the idea of maybe using a helium-filled inflatable cloud, attach it to the vehicle and tow it behind while I'm shooting. And then, you look at the environment, it's a forest, you know there's no way you're going to tow anything, it was ridiculous. So mostly the lighting was driven by time of day. We did a lot of work in pre-production to schedule for the time of day and the direction of shooting

Phillip wanted a progression of going from an urban environment into a more and more remote wilderness, *Heart of Darkness* kind

of vibe, where it becomes more and more wild. And then she has to emerge from that as well. Because it plays in real time and we never leave her, the lighting was done through very intricate scheduling and planning with the location scouts. We mapped that out, and a lot of the time we would switch locations based on what the weather was going to be as well. Naomi was great at jumping to a different scene at short notice.

### **Was the e-bike camera looking ahead of Naomi or looking backwards?**

Backwards, most of the time. Sometimes we did follows, rigging it on the front of the bike.

### **When you're leading her, how is the camera and SRH-3 Head attached?**

The head was usually underslung from a Flowcine Black Arm rigged to the back of the bike. The wireless video and the receiver for the controls was off to the side. The great thing about the ARRI head is that the wireless protocols work from what seemed like a million miles away. We never have trouble with the range, and it is very simple and quick to set up.

### **What about lighting?**



ARRI SRH-3 remote head with vibration isolating Flowcine Black Arm on Zero FXS Electric Motorcycle.

There's a great French company called Ruby Light, I think they're distributed by K5600 in the U.S. Essentially, they're an LED strip sewn into fabric. I think if you go [rubylight.fr](http://rubylight.fr), and they're named after... They're basically long, soft, flexible LED bi-color ribbons—waterproof-ish, with Velcro and magnets to attach diffusion and modifiers. I strapped some Ruby Lights on the base of SRH-3 as a bit of an eye light, a little bit of fill.

### Where were you operating the remote head?

We would be up ahead, sometimes. And then, I kid you not, we ended up renting a Tesla as the director's video village when we were on paved roads. It was quieter; you only had the tire noise. The noisier gas-powered vehicles would be way ahead in the convoy.

Makeup, hair, and the rest of the procession would travel further ahead. To get a take going would take about 30 minutes because you had to have the right order of vehicles, often the road was only wide enough for one vehicle, so you'd have this convoy and then the last vehicle would typically be the Tesla with Phillip in it. But we also had a focus puller, a script supervisor, and so on, we'd spread it across a couple of vehicles as well, and the electric ones were the ones that were closest to the camera.

Anyway, I, or my A/Steadicam operator Yoann Malnatiwas operating off a Small HD 17-inch monitor, sitting at the base station, often on a Grip Trix type electric vehicle. My focus puller was riding alongside. We had ARRI WCUs. That's another good thing about the ARRI head: it integrates nicely with the other ARRI accessories.

### In summary?

The story for me was, "How do you shoot a film with only one protagonist, in real time, and she's running for 85% of the film, and you never cut away to the other side of her phone call, you only hear the other side of the phone call."

### Since you did *The Desperate Hour*, Blackmagic Camera Update 7.7 came out. Comments?

I actually have tested 7.7 firmware extensively and it's a major improvement over the previous 12K firmware, especially with regards to the way the camera processes the unique RGBW sensor. The demosaic is substantially improved and this for me has meant less noise and a lot less chroma moiré on super fine detail. Once you combine it with the OLPF from RAWLITE, it's really maturing into a solid performer image-wise.

# Rawlite OLPF for Blackmagic URSA Mini Pro 12K



Rawlite makes Optical Low Pass Filters for Blackmagic cameras that replace the sensor's existing IR blocking filter. The Rawlite OLPF specifically designed for the Blackmagic URSA Mini Pro 12K prevents moiré while still preserving the fine detail that this camera can capture.

In addition to blocking near-infrared wavelengths with its anti-reflective coated hot mirror (dichroic filter), the Rawlite OLPF reduces aliasing and moiré that might occur.

Many digital cinema cameras (including ARRI, SONY, RED, CANON) have OLPFs (also known as anti-aliasing filters). Some are swappable, others are fixed. Recently, as resolution increases and the sensor's photosite size gets smaller, some companies have avoided the OLPF entirely: Leica, Nikon, Canon still cameras.

You also hear the term cover glass. It covers and protects the sensor and may be an OLPF or it may be just an IR blocking filter. Even without an OLPF, the cover glass most likely will still have the IR blocking filter, aka IR-Cut, aka Hot Mirror.

Because the URSA Mini Pro 12K has a resolution of 12,288 x 6,480, and a pixel pitch around 2.2 microns, the chance for moiré is less than a camera with bigger photosites. But if you're filming an actor with a checked shirt and Harris Tweed jacket, you still might see a dreaded moiré pattern. John Brawley adds, "Typically the URSA 12K resolution is so high when shooting 12K native that you don't notice it much unless you really go looking. URSA 12K at 8K and 4K modes becomes slightly more prone to moiré," like most cameras of those resolutions.

The original IR absorption filter of the Blackmagic URSA Mini Pro 12K does not have an OLPF. But, Blackmagic made it easy to change the filter. Remove it by unscrewing three little screws. Use the magnetic screwdriver that comes with Rawlite's OLPF kit.

After removing the filter the Rawlite OLPF can take its place.

The Rawlite OLPF is slightly thicker than the original IR filter. Therefore, a shim is needed to correct back focus. A 0.3mm shim is included in the kit, as well as tools needed for installation. Rawlite Optoelectronics OLPF, shim and tools: \$435.00

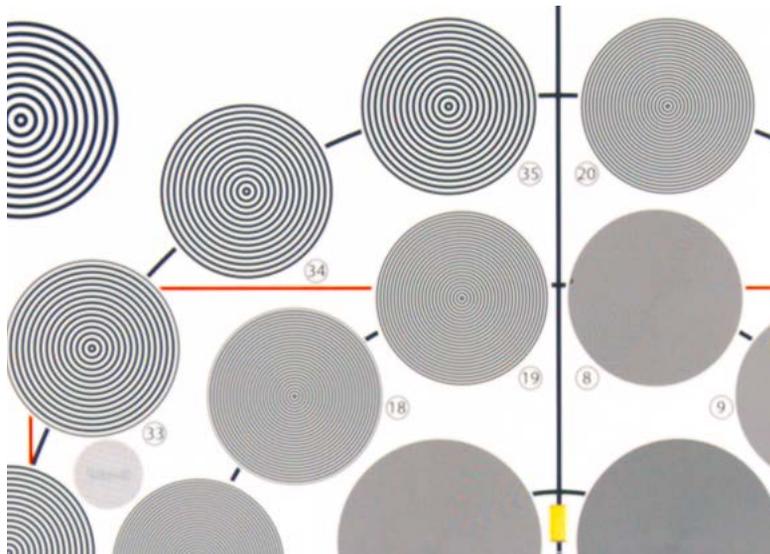
I talked to Hans Hijmering, filmmaker and maker of Rawlite OLPFs.

**Jon Fauer: Please tell us about your work, how you decided to make these filters, and how it started?**

Hans Hijmering: We are professional photographers and filmmakers. In our work of event (live theater) recording, we learned that traditional broadcast cameras struggle with the high

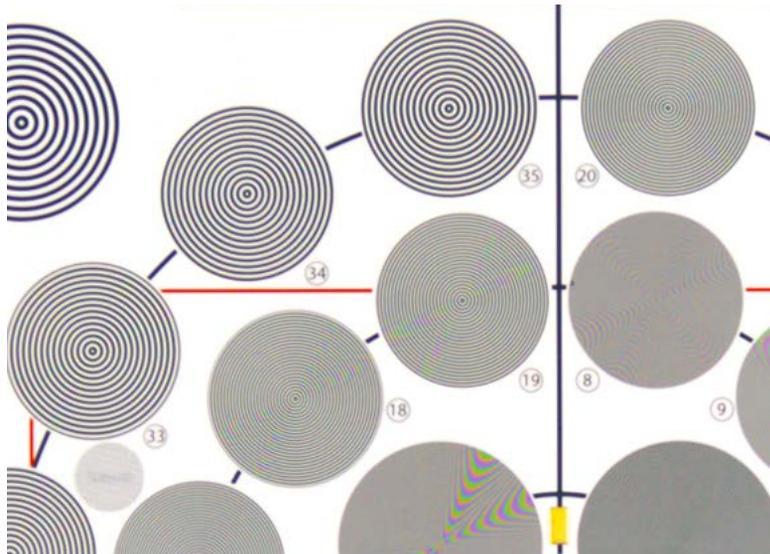


# Hans Hijmering on Rawlite OLPF for URSA 12K



12K Q0 Blackmagic Raw 24 fps 320 ISO. Above: URSA 12K with Rawlite OLPF.

Below: URSA 12K with original Blackmagic cover glass. The effect is a gentle smoothing of super-fine detail, less fear of aliasing, slight decrease of IR blue. Don't be alarmed by the charts, you're not usually filming charts in real life.



contrast of theater lighting—lighting that's designed for a live audience, not for camera.

When Blackmagic released their first cameras, the Cinema Camera 2.5K and then the Pocket Cinema Camera, we were immediately pleasantly surprised by the organic (yes, film-like) feel of the image. There were drawbacks, of course, among them were moiré and IR pollution. Convinced as we were of the potential of the Blackmagic cameras, we started studying ways to overcome these issues. This was the start of the development of the Rawlite Optical Low Pass Filter (OLPF).

## What actually is an OLPF?

An OLPF consists of birefringent crystal layers that split the light with a precisely determined offset. This is far more precise—and therefore more detail preserving—than simply blurring the light. It hands the demosaicing algorithm just the right information to avoid unnaturalistic “surprises” like moiré and aliasing. Because precision is key, OLPF design is sensor specific.

We've also incorporated an infrared absorption layer and very effective anti-reflective and infrared-cut coatings. The latter eliminates the need for expensive IRND, and/or different diameter filters in front of the lens. Our blue/green IR absorption layer is very well protected against corrosion due to moisture (sometimes referred to as fungus).

## Does the OLPF slightly diffuse the image?

“Diffusing” — like “blurring” — might sound like uncontrolled spreading of the light. The underlying question is “does the image lose detail?” An OLPF passes the amount of detail that the sensor can handle; no true detail is lost. It takes away the digital edge of the image, making it appear more natural.

## Why do you think Blackmagic skipped using an OLPF?

It's really up to Blackmagic to say. Each sensor needs its own specific OLPF. Maybe they wanted to leave it up to a company like us at Rawlite to provide OLPFs to users who desired them :)

[rawlite.com](http://rawlite.com)