

# FILM **AND** DIGITAL TIMES



## Blackmagic URSA Mini Pro 12K Special Report



John Brawley with  
Blackmagic URSA Mini Pro 12K



# Blackmagic URSA Mini Pro 12K



Super35 Format Sensor:  
27.033 mm wide x  
14.246 mm high

Camera Body Actual size:  
5.92" W x 9.2" L x 5.78" H

The Blackmagic URSA Mini Pro 12K costs less than \$10K. It dares to defy a typical engineering riddle—pick any four of six: quality, resolution, easy data wrangling, size, weight, cost.

Incredibly, URSA 12K gives you all six.

As John Brawley said in *FDTimes* a few months ago, “Blackmagic threw millions of dollars at developing their own 12K sensor from scratch when you would struggle to even get 8K. I think that shows their ongoing maturation as an imaging company.”

URSA 12K is a serious camera now shooting seriously stellar Super35 images at an astonishing 79.6 Megapixels per frame (12,288 x 6480) up to 75 fps in 2.39:1 (2.4:1), among many other aspect ratios, frame rates and resolutions.

Blackmagic RAW (BRAW) 12-bit files can be nimbly edited and finished even on a laptop. URSA 12K weighs about 5.6 lb and is slightly larger than a large can of Fosters. You probably already know Blackmagic’s URSA Mini Pro 4.6K G2, so jumping in with the URSA Mini Pro 12K will be familiar. The camera body is the same size and shape. Accessories fit both. Controls, switches and dials are in the same places. Three internal ND filters and one

clear filter with IR compensation can be summoned up with the twist of the ND dial: Clear, 2, 4 or 6 stops.

The camera comes with a PL mount. You can swap it quickly and easily for an optional EF or F mount. The EF mount offers autofocus and auto/user controlled exposure. The PL mount provides /i metadata embedded recording.

The main display on the camera left door shows timecode, shutter, lens settings, battery, recording status and audio levels. The display is backlit and visible in dimly lit studios or direct sunlight. Open the display door to reveal a 4-inch LCD touchscreen monitor and dual CFast 2.0 and UHS-II SD media slots. If you’d like more recording time, connect a SATA or NVMe drive to the camera’s rear USB-C 3.1 Gen 2 port.

A BNC connector at the front camera right side provides HD-SDI (up to 3G). This is where you’ll plug in Blackmagic’s excellent 1920 x 1080 OLED URSA Viewfinder. It’s an essential optional extra and the \$1495 price is a bargain compared to one out-of-focus shot. The camera’s rear BNC provides menu-selectable 4K SDI or HD-SDI (up to 12G) output.

# Blackmagic URSA Mini Pro 12K Views



Front view  
with EF  
Mount



Rear with V-Lock Battery  
Bracket



Camera  
Left with  
EF Mount



Camera Right  
with EF Mount



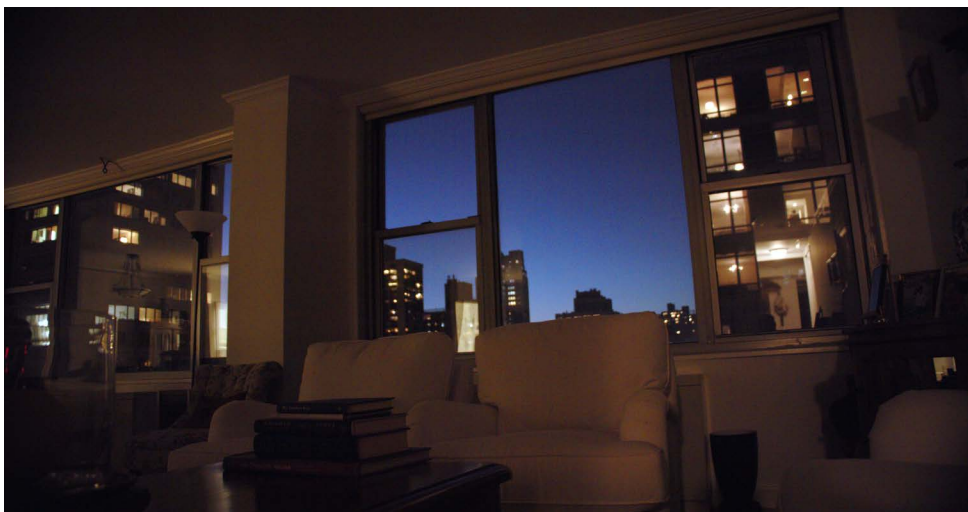
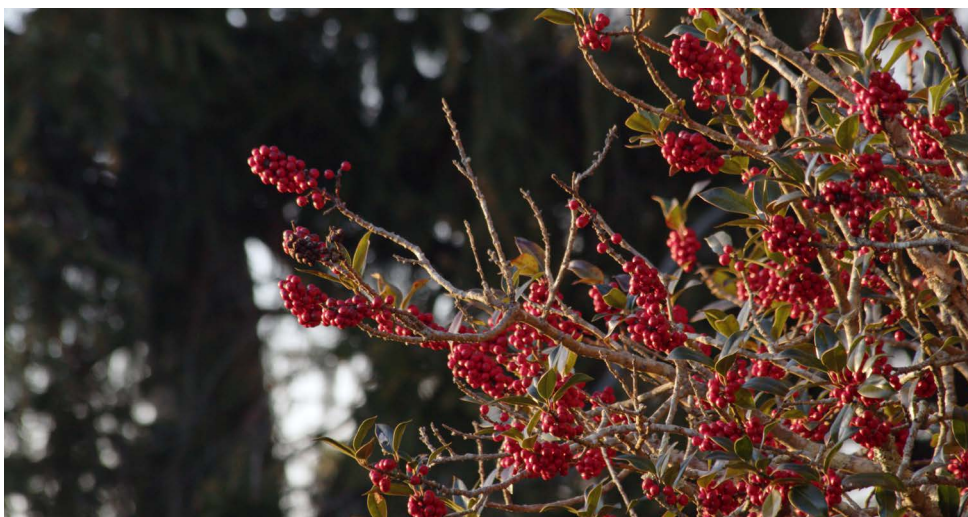
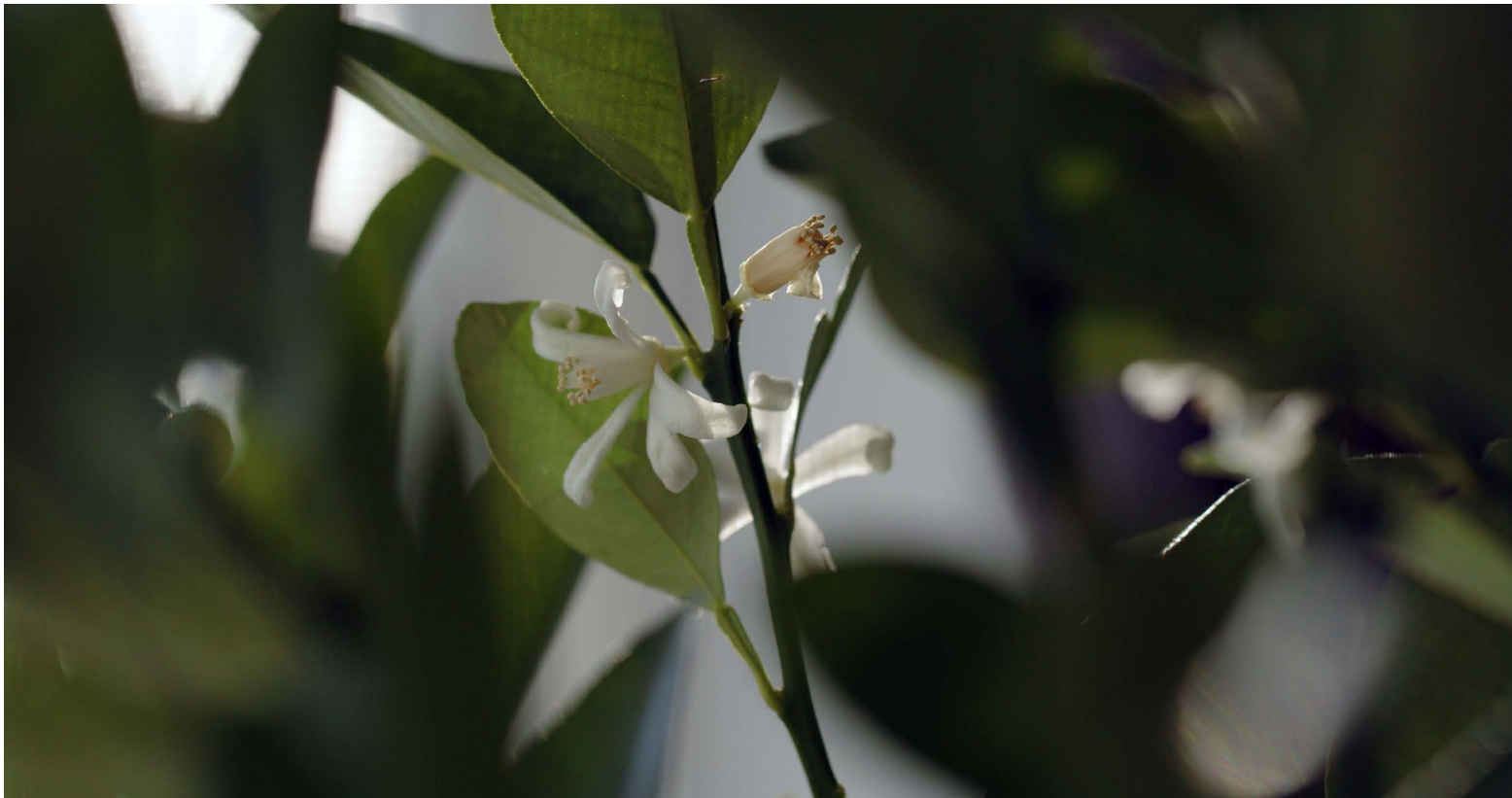
Right Front  
with PL  
Mount



Top: 2 XLR 3-pin audio  
connectors are located  
under rubber flap at  
rear. The 4 mounting  
threads are 1/4-20.



Bottom: the 5  
mounting threads  
are all 1/4-20.



Above: DaVinci Resolve Frame Grab from URSA 12K shooting Blackmagic RAW Q0, 12288 x 6480, 24 fps, 800 ISO, Blackmagic Gen 5 to Extended Video LUT; with Canon EF 100mm f/2.8L Macro IS USM at f/4.8.

Left: DaVinci Resolve Frame Grab enlarged 4x from URSA 12K, BRAW Q0, 12288 x 6480, 60 fps, 1000 ISO, Blackmagic Gen 5 to Extended Video LUT; with Canon 70-300 f/4-5.6 IS USM at f/5.6.

Frame grabs from video are larger than what many still cameras can shoot. This exported 456 MB TIF file provides massive picture information to zoom or crop in Photoshop.

DaVinci Resolve Frame Grab from URSA 12K shooting Blackmagic RAW Q0, 12288 x 6480, 24 fps, 3200 ISO, 36- degree shutter, Blackmagic Gen 5 to Extended Video LUT 3200; with Canon EF-S 18-135mm f/3.5-5.6 IS STM at 18mm f/3.5.

## Burberry on URSA 12K



Vance Burberry with URSA 12K on KIA “Emmys” commercial.

URSA 12K is already at work on features and commercials.

Vance Burberry shot with two URSA 12K cameras for a major KIA spot that aired during the 2020 Emmy Awards Show. His complete interview will be published soon, and here’s an excerpt:

“URSA 12K has a new sensor with an equal number of red, green, and blue pixels plus there are white pixels. Its 12K resolution has all the detail and information without being painfully sharp. Sort of like film. You imagine a digital version of film and this appears to me to get closer. I’d shoot close-ups on a female and have all this beautiful detail, but it’s not harsh. I don’t have to say, ‘Go wide, make the lights softer.’

“It actually has sharpness and softness at the same time, if that makes any sense. It’s got a beautiful quality to it. It’s impressive. Normally if you said, ‘here’s a 12K camera,’ I’d have walked away.

“I’ve always said that digital is like painting with acrylics and film is like painting with oil. There’s a depth and luminosity to oil that acrylic paint doesn’t have. I think this new camera now has grasped that concept of a film-like quality. The pixels are so fine, but they are not harsh. It’s quite amazing.”

Agreed.

Another analogy could be a painter’s canvas. A rougher weave results in more visual texture. Seen from a distance, the painting may appear softer, less focused. Skin tones and fine detail might be more impressionistic.

The URSA 12K camera’s high resolution sensor is like a canvas with a finer weave—a higher thread count. The image can appear

sharper. Fine detail and skin tones are not competing with the texture of the medium. But you can still create an impressionistic image with lighting, filters and post-production procedures.

This was always going on in the film days. You had a choice of camera negatives with bigger grains like Kodak Vision3 500T or finer grains like Vision3 50D. The 500T was more sensitive to light—helpful for night exteriors and low-light locations—but the grain and texture was more apparent.

URSA 12K is rated at 800 ISO. The sensor is 27.033 mm wide x 14.246 mm high. The unpublished pixel pitch is about 2.2 microns.



# URSA 12K Right Side



Up to now, hymns of “Bigger Pixels Better Pixels” and “Fewer Pixels Less Heat” have been cantillated.

So how does URSA Mini Pro 12K confound current credo with smaller pixels and more of them?

Blackmagic’s 12K sensor does not have a typical RGB Bayer pattern color filter array. Instead, it’s an equal arrangement of RGBW—red, green, blue and clear (unfiltered-white). The W (clear) photosites add additional values of brightness and sensitivity to the RGB color-filtered photosites to get extended dynamic range and lower noise. You can find the patent online.

The 12K sensor scales from 12K to 8K or 4K without cropping or binning. Most of us who have shot commercials never encountered an art director lacking an irresistible urge to repo (reposition) and blow up (enlarge) things in post. Often, the only restriction was resolution: blow up too far and it looks like noisy gold balls. If you’re shooting in 12K and finishing for 4K, that art director will weep with joy at the almost limitless possibilities to mess with your masterpiece and zoom in on the product’s logo. Even better, you can grab individual frames in DaVinci Resolve (View>Stills>Grab Still) and then Export (Right Click on the thumbnail>Export with LUT).

Bob Caniglia, Blackmagic Design Director of Sales Operations, North America, explained efficiencies of 12K: “On its own, 12K is obviously a huge number. In order to shoot 12K or 8K, you truly need to be able to use it. One of the challenges set out from the start of this project was to be able to have hardware over-sampling to make 8K files or 4K files from the 12K files, but to be able to do it without requiring a supercomputer.

“It was a combination of our managing the color science, having Blackmagic RAW, developing the sensor and having DaVinci Resolve Studio (included with the camera) on the back end to deal with the files. For example, this camera lets you shoot 12K plates for VFX. For 8K or 4K, the camera does in-camera hardware scaling. And, if you’re shooting vertical video, you get a 6K vertical format.”

The URSA 12K records in constant quality or constant bit rate.

Constant bit rates are 5:1, 8:1, 12:1 or 18:1. So, 12K 5:1 at 24 fps is close to 600 MB/s. 18:1 in 12K at 24 fps gets it down to 160 MB/s.

“Constant quality choices are Q0, Q1, Q3 and Q5. Image quality stays the same but the amount of compression varies depending what you are filming.

For example, if the scene involves an actor standing still in front of a white cyc, the image data can be compressed more because there is very little detail in the background and little movement. However, if you are filming an actor running in the street, the camera would demand less compression to get the same quality because there’s a lot more fine detail and motion. In Q0, the highest quality, data rates are from 289 to 1200 MB/s. The compression ratio ranges from about 5:1 to 12:1, depending on the scene. Q5 is constant quality with the most compression—from 96 to 413 MB/s.

## BLACKMAGIC URSA Mini Pro 12K Summary

- 12,288 x 6480 12K Super35 sensor.
- 14 stops of dynamic range and native 800 ISO.
- Up to 60 fps in 12K; 120 fps in 8K DCI; 240 fps in 4K S16.
- Dual CFast 2.0 slots for recording to 900 MB/s.
- PL mount included; EF and F mounts available.
- USB-C 3.1 Gen 2 for recording to external disks.
- Includes DaVinci Resolve Studio which edits and grades Blackmagic RAW 12K in real time.
- Size: 5.92” W x 9.2” L x 5.78” H. Weight: 5.62 lb.
- **Blackmagic URSA Mini Pro 12K: US \$9,995.**
- **Blackmagic URSA Viewfinder (essential): US \$1,495.**
- **V or Gold Mount Battery Plate (essential): \$95.**
- **Shoulder Kit w/ top handle for EVF (almost essential): \$395.**
- **Blackmagic URSA Mini Hand Grip (helpful): \$199.**
- Comes with PL Pro PL Mount with /i contacts.
- EF Mount with lens data and power pogo pins: \$175.
- Pro F Mount w/ back focus adjustment, no lens contacts: \$375.
- Recorder attaches to rear for NVMe or SSD media: \$395.

# URSA 12K Left Side



Camera Left with Side Door Closed (above) and Open (below)



# URSA 12K Menu



Open the swing-away monitor on the camera left side. The monitor does double duty for viewing and menu selection. Note: you cannot output the menu to external monitors.

Download Blackmagic's excellent and comprehensive 3202-page User Manual, in 11 languages, 292 pages of which are English. If you're working under the Rusty Gates 10-minutes to learn a

camera rule, the next 3 pages offer an abbreviated cram course.

You can control basic settings things with the monitor's touch screen. But first, you should set overall project settings, codec, resolution, project frame rate and so on. Push the MENU button located below the Blackmagic Design logo. Here we go:



1. This is the MENU home page. Let's set up the main parameters that should give us the best-looking images:

**CODEC AND QUALITY: Blackmagic RAW, Constant Quality Q0, 12K.**

2. **DYNAMIC RANGE > Film** provides the greatest latitude, up to 14 stops on the URSA 12K.

**PROJECT FRAME RATE** can be thought of as "projection speed."

**OFF SPEED RECORDING > ON** enables the slow motion (overcranking) or quick motion (undercranking) speed that you set in the **OFF SPEED FRAME RATE** window. Here, you have **60 fps**. To calculate the effect, divide Off Speed Recording by Project Frame Rate. So,  $60 \div 24 = 2.5$  times slow motion. Be sure to assign a Function Button to turn this on and off without having to go diving into the menu.

# URSA 12K Menu



3. APPLY LUT IN FILE and STOP RECORDING IF CARD DROPS FRAME.



4. Monitor Settings Page. LCD is the swing-out monitor display.



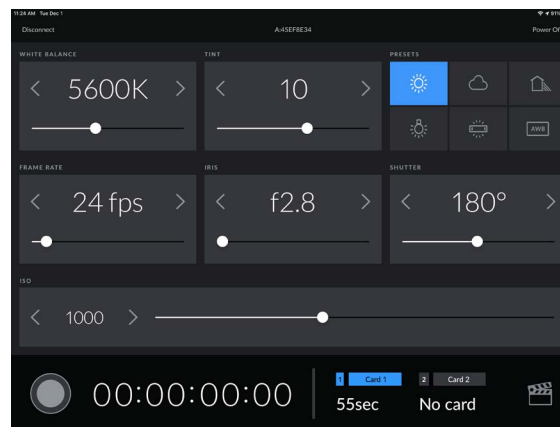
5. Front SDI is usually the camera operator's EVF.



6. Main SDI is the BNC output at camera rear, usually going to Video Village.



7. URSA 12K has built-in WiFi that connects to iOS or Android.



8. Blackmagic Camera Control on iPad, connected by WiFi.



9. When all else fails, Reset camera to factory defaults.



10. Choose a LUT here or load your own on the next menu screen.

# URSA 12K Touchscreen



1. Touch the top left framing icon to set frame lines.



2. Slide through the usual suspects shown at the bottom of the screen.



3. Touch and hold on any aspect ratio at the bottom to define your own.



4. Nice UI. Enter your own aspect ratio. Be sure to confirm **UPDATE**.



5. Your new aspect ratio is now part of the list at screen bottom.



6. Choose **FPS** on top line. Select off-speed rate at bottom. Turn ON or OFF.



7. This shows that 2 minutes remain on our CFast 2.0 card in slot 1.



8. Red means recording. Yikes, 31 seconds until empty.

# Formatting URSA 12K



1. You can format media from the touchscreen.



2. This shows 1 minute remaining, 26 GB used on a 64 GB card.



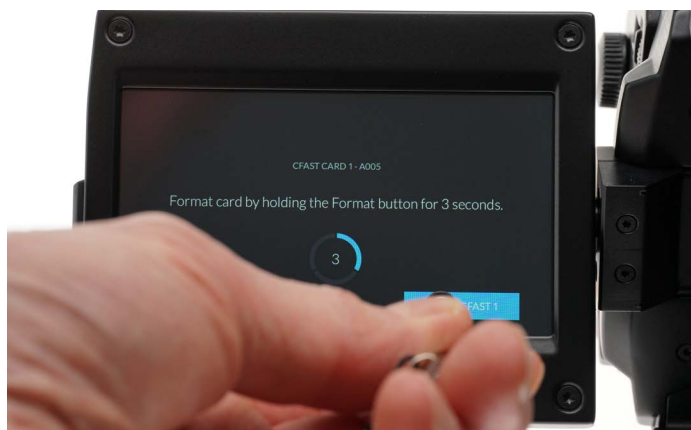
3. Of course, you've downloaded the data. OS X Extended is for Mac.



4. Format CFAST Media in slot 1 to OS X Extended.



5. To be sure you are committed, it requires your undaunted attention.



6. Touch the Format button for 3 seconds.



7. Formatting in progress.



8. Ready to roll.

# URSA 12K Accessories



URSA 12K with PL Mount



URSA 12K with EF Mount



PL Mount



EF Mount



F Mount



Shim Kit

The Pro Mounts, Shim Kits and accessories on this page are common to most of Blackmagic URSA Mini camera models.

URSA Mini Pro 12K ships with a PL Pro Lens Mount that has /i Metadata pogo pins at the typical 12 o'clock position.

EF (Canon Style), F (Nikon style) and B4 lens mounts are sold separately. Swapping them is quick and easy. To remove the PL mount, unscrew the six hex screws with a 2 mm driver. You will have to rotate the PL breech lock to access all the screws.

The EF mount is secured with four 2 mm hex screws. Blackmagic

recommends a 2 mm torque driver adjusted to maximum torque of 0.45 Nm (3.99 Inch-Punds) to prevent overtightening.

The URSA Mini Pro F Mount has a mechanical iris control that works with Nikon AF-S G and AF-D lenses.

It would be almost unthinkable to change lens mounts without access to extra shims, so a Shim Kit is included with each Lens Mount Kit. A Shim Kit can also be purchased separately.

I also recommend a DENZ FDC-Multi to check flange focal depth once the new mount is installed.



Blackmagic URSA Mini Shoulder Kit



URSA Mini Hand Grip



Blackmagic URSA Mini OLED  
1920 x 1080 Viewfinder



URSA Mini SSD Recorder

The URSA Mini SSD Recorder bolts onto the back of the URSA Mini Pro 12K, between the camera and battery plate. It provides another option to record media onto large, affordable 2.5" NVMe or SSD drives.

# URSA 12K Math



Thanks to Blackmagic's  
URSA Mini Pro 12K Data  
Rate Calculator:  
[tiny.cc/URSA12k-DataRate](http://tiny.cc/URSA12k-DataRate)

## Shooting Resolutions

- 12,288 x 6480 (12K DCI)
- 11,520 x 6480 (12K 16:9)
- 12,288 x 5112 (12K 2.4:1)
- 7680 x 6408 (12K Anamorphic)
- 8192 x 4320 (8K DCI)
- 7680 x 4320 (8K 16:9)
- 8192 x 3408 (8K 2.4:1)
- 5120 x 4272 (8K Anamorphic)
- 6144 x 3240 (6K Super16)
- 4096 x 2160 (4K Super16)
- 4096 x 2160 (4K DCI)
- 3840 x 2160 (4K 16:9)
- 4096 x 1704 (4K 2.4:1)
- 2560 x 2136 (2K Anamorphic)

## Maximum Slow Motion Frame Rates

- 12K 17:9 full sensor to 60 fps
- 12K 2.4:1 to 75 fps
- 8K DCI full sensor to 120 fps
- 4K DCI full sensor to 120 fps
- 8K 2.4:1 to 160 fps
- 4K 2.4:1 to 160 fps
- 6K Super16 to 120 fps
- 4K Super16 to 240 fps

## Project Frame Rates

- 23.98 fps
- 24 fps
- 25 fps
- 29.97 fps
- 30 fps
- 50 fps
- 59.94 fps
- 60 fps

## Some Approximate Recording Times

Blackmagic RAW Constant Bitrate 5:1  
in 12K 17:9 DCI on a CFast 2.0, 1TB  
Media Card:

- |             |           |
|-------------|-----------|
| • 24 fps    | 28.9 mins |
| • 25 fps    | 27.7 mins |
| • 29.97 fps | 23 mins   |
| • 30 fps    | 23.1 mins |
| • 40 fps    | 17.3 mins |

Blackmagic RAW Constant Quality Q0  
12K 17:9 DCI on a CFast 2.0 64 GB  
Media Card:

- |          |          |
|----------|----------|
| • 24 fps | 1.5 mins |
|----------|----------|

## Codecs

- Blackmagic RAW Constant Bitrate 5:1
- Blackmagic RAW Constant Bitrate 8:1
- Blackmagic RAW Constant Bitrate 12:1
- Blackmagic RAW Constant Bitrate 18:1
- Blackmagic RAW Constant Quality Q0
- Blackmagic RAW Constant Quality Q1
- Blackmagic RAW Constant Quality Q3
- Blackmagic RAW Constant Quality Q5

## Recording Formats

- BRAW Constant Quality Q0, Q1, Q3, Q5
- BRAW Constant Bitrate 5:1, 8:1, 12:1, 18:1

12,288 x 6480	5120 x 4272
11,520 x 6480	6144 x 3240
12,288 x 5112	4096 x 2160
7680 x 6408	3840 x 2160
8192 x 4320	4096 x 1704
7680 x 4320	2560 x 2136
8192 x 3408	

12-bit non-linear files with 3D LUTs  
embedded in metadata

## Data Rates of Blackmagic RAW 5:1 Constant Bitrate

• 12K	17:9	12288 x 6480	24 fps:	578 MB/s
• 8K	17:9	8192 x 4320	24 fps:	257 MB/s
• 4K	DCI	4096 x 2160	24 fps:	65 MB/s

## Data Rates of Blackmagic RAW Q0 Constant Quality

• 12K	17:9	12288 x 6480	24 fps	289 -1200 MB/s
• 8K	17:9	8192 x 4320	24	257- 642 MB/s
• 4K	DCI	4096 x 2160	24	161-268 MB/s

# Outfitting URSA 12K with Bright Tangerine

Misfit Kick 3-Stage  
Mattebox with 95mm  
Frame Safe Clamp  
Back



ONE Tray for Misfit Kick and  
ARRI LMB— for Rota Pola,  
Variable ND and Diopters.



Many parts come in cloth  
pouches like the ones fancy  
shoes come in..

Left Field  
ARRI  
Standard  
Dovetail



Top Handle



Left Field 15mm  
Rod Bracket for  
Top Plate.



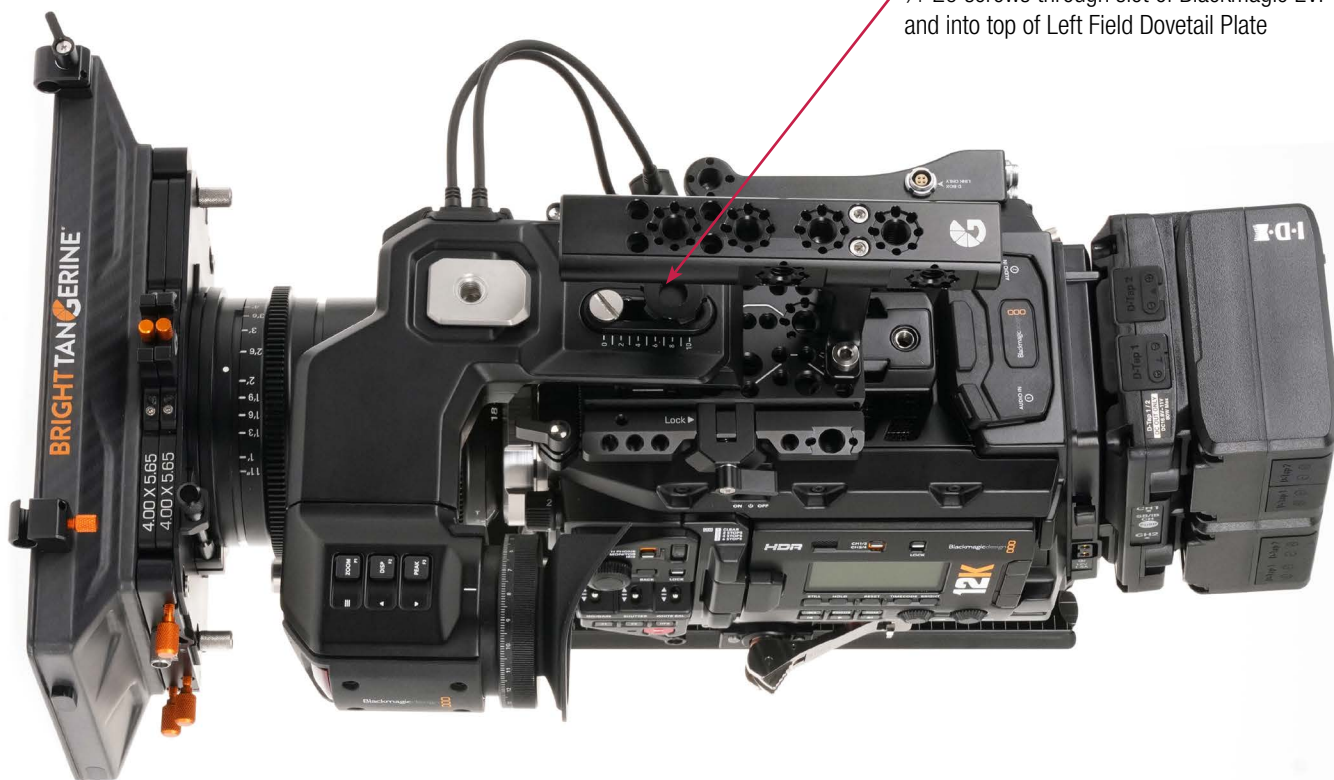
Left Field Universal 15mm LWS Core Mk II Quick  
Release and Blackmagic URSA Mini Baseplate



Sliding Top Plate Core and Left Field Dovetail Plate



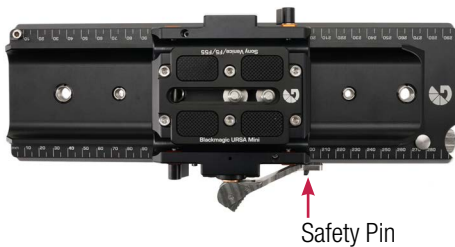
Drumstix 15mm Titanium Support Rods, 9" long



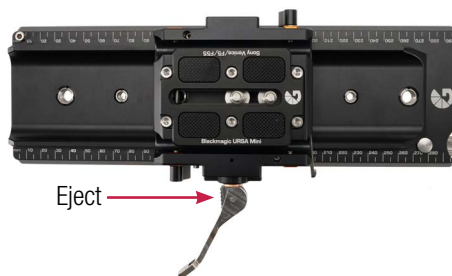
Bright Tangerine Top Handle secured with two  
1/4-20 screws through slot of Blackmagic EVF  
and into top of Left Field Dovetail Plate

# Outfitting URSA 12K with Bright Tangerine

The corners of the Frame Safe Clamp Back have convenient cut-outs in the 4 corners to avoid vignetting on wide lenses



Safety Pin



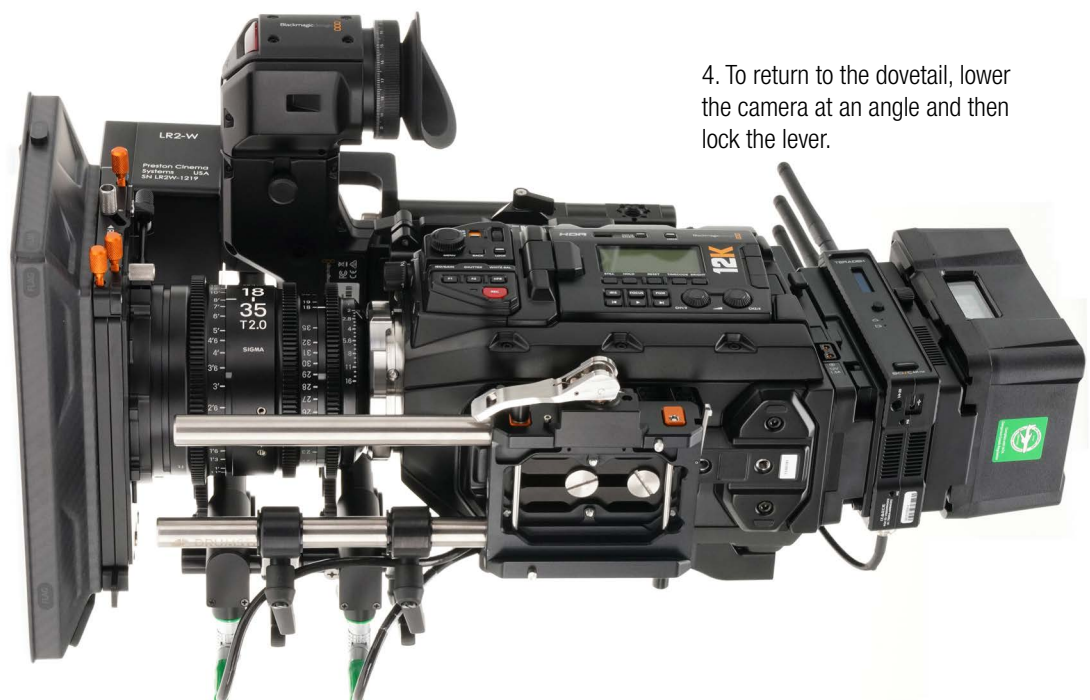
Eject



The Bright Tangerine 3-step Quick Release Open Up System. Step 1: Release lever from safety pin and open half way.

2. Half way. This is the sliding position. Press the Eject Tab to release the 2nd safety catch.

3. Open all the way and then lift up and away from the dovetail.

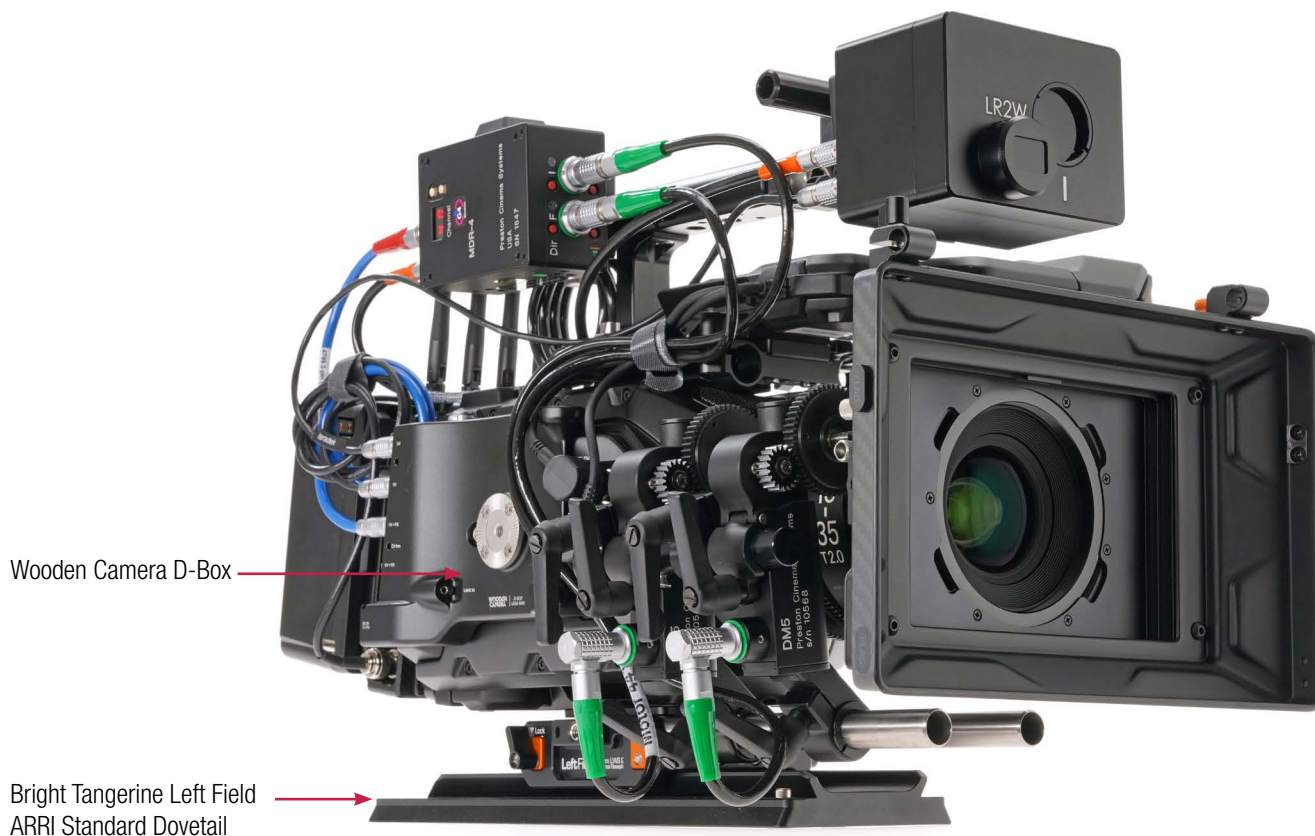


4. To return to the dovetail, lower the camera at an angle and then lock the lever.

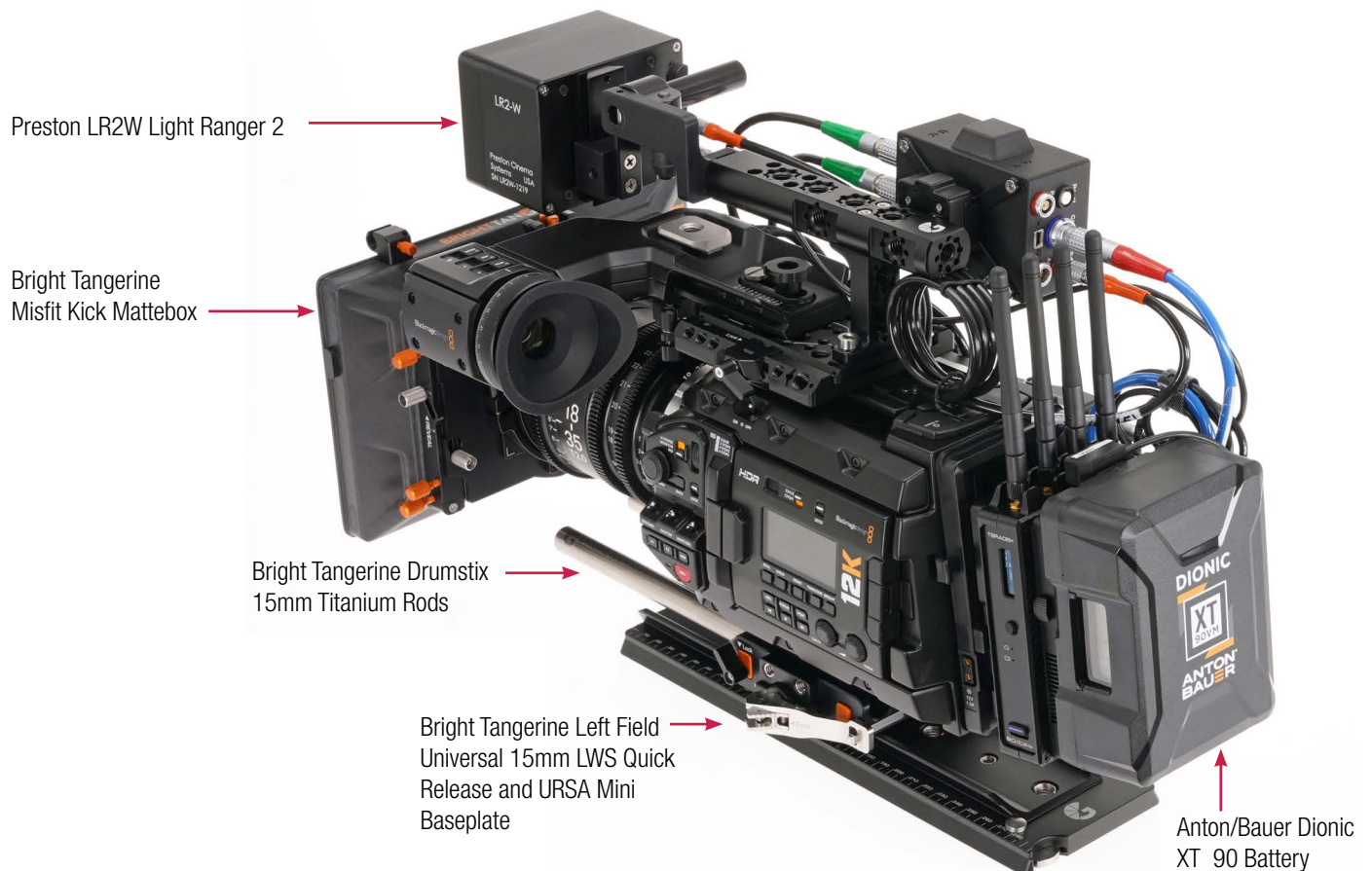
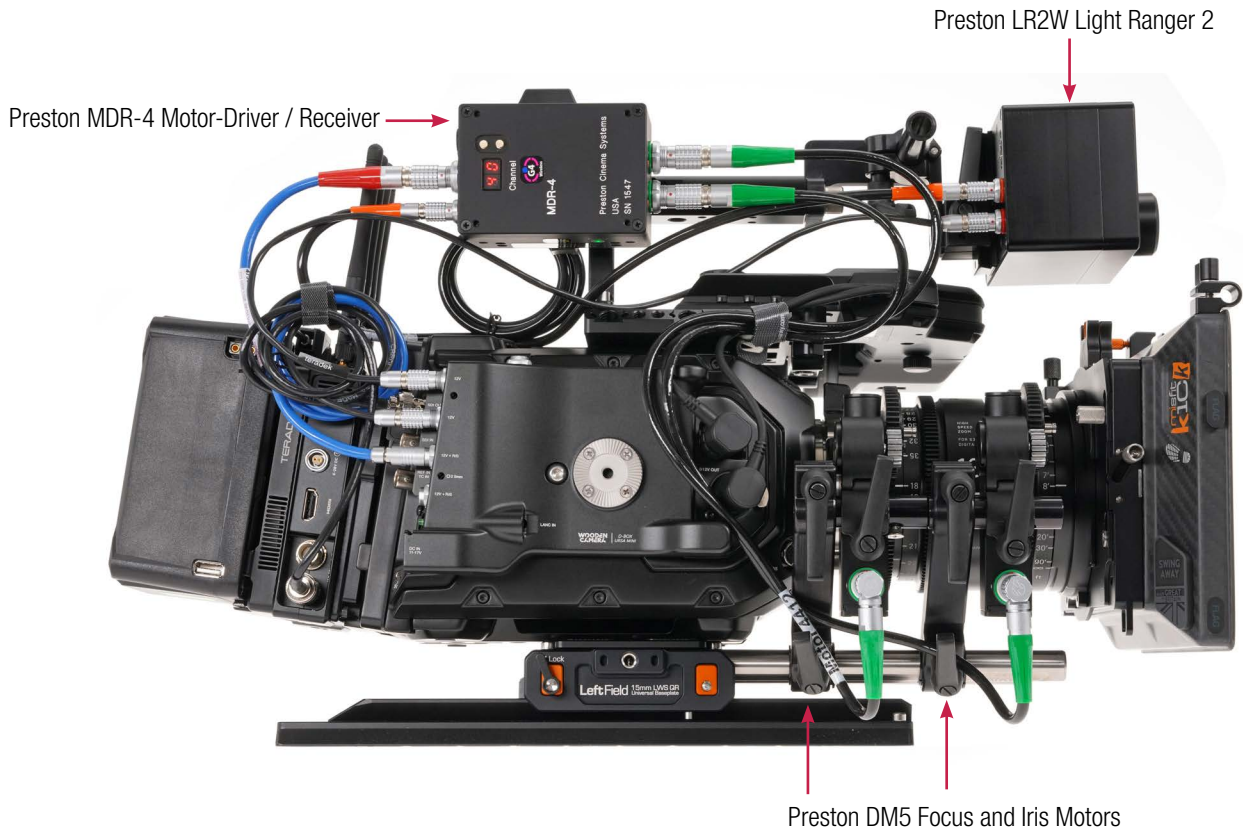
# Outfitting URSA 12K Chockers



Thanks to John Brawley for the Australian translation of “fully festooned.” Chockers, as in Chock-o-Block. Because the URSA 12K camera package will be shooting major shows, you will see many of them in full chockers mode, like these photos.

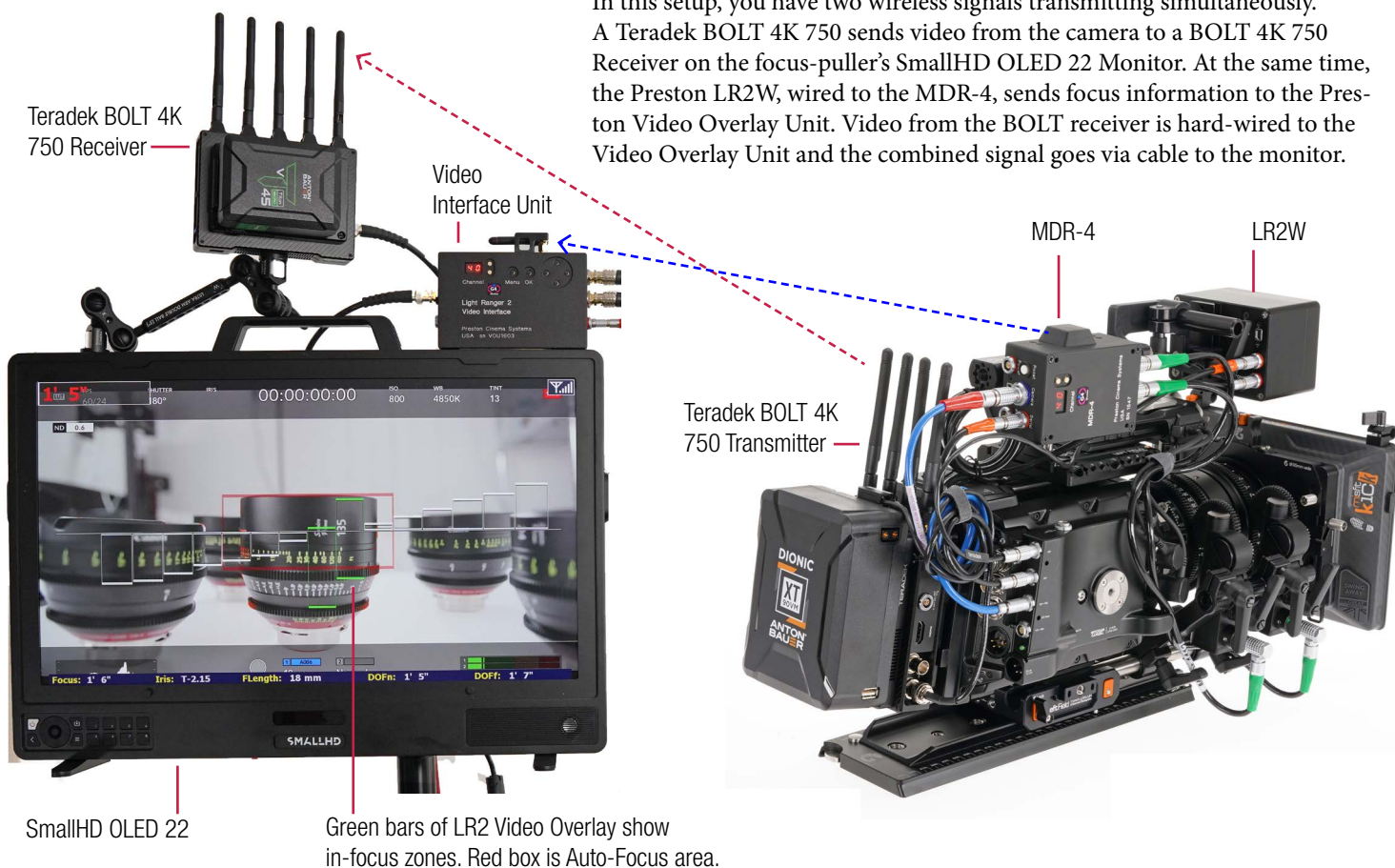


# Outfitting URSA 12K Chockers



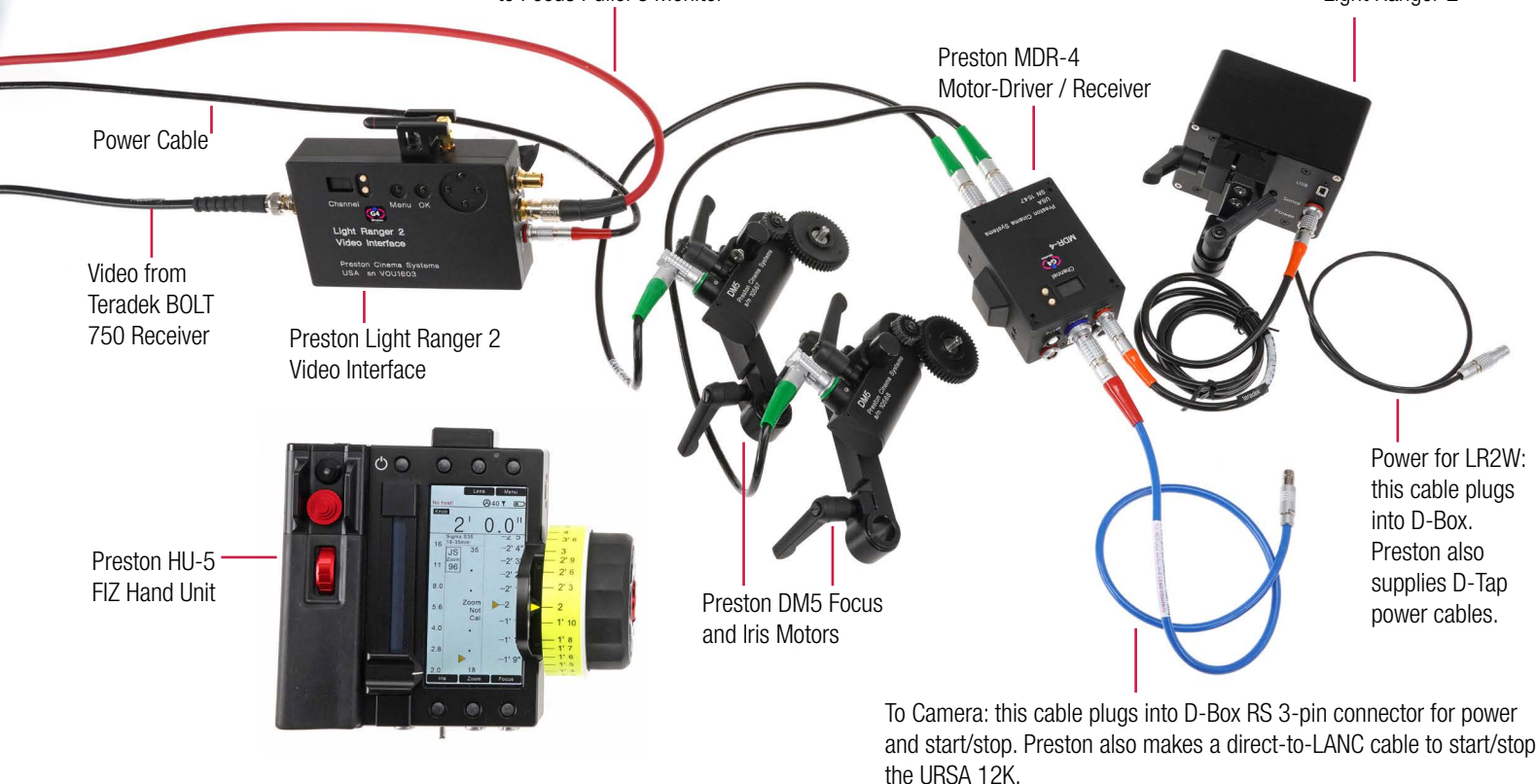
## Connecting URSA 12K

In this setup, you have two wireless signals transmitting simultaneously. A Teradek BOLT 4K 750 sends video from the camera to a BOLT 4K 750 Receiver on the focus-puller's SmallHD OLED 22 Monitor. At the same time, the Preston LR2W, wired to the MDR-4, sends focus information to the Preston Video Overlay Unit. Video from the BOLT receiver is hard-wired to the Video Overlay Unit and the combined signal goes via cable to the monitor.



## Connecting Preston

Video from BOLT with LR2 Focus Overlay to Focus Puller's Monitor



# Outfitting URSA 12K with Wooden Camera D-Box

Two IDX Imicro-98  
Li-Ion 14.5 V  
6.62Ah Batteries with IDX  
A-Vmicro2 Hot  
Swap V-Mount  
Plate for Imicro  
Batteries



Wooden Camera URSA 12K  
D-Box provides valuable ac-  
cessory power and RS 3-pin  
start/stop.

To attach the D-Box:  
Remove the two T10 Torx  
screws holding the rear  
BNC identification plate.

Attach the D-Box with its  
two small captive HEX  
screws (not Torx ) at the  
back, and the big hex screw  
in the middle.

Connectors include:

- 1x D-Tap, 12V  
Unregulated
- 1x USB, 5V Regulated
- 2x 2-pin LEMO  
compatible, 12V  
Unregulated
- 2x 3 pin Fischer  
compatible 24V  
Regulated and Start/Stop.



# Blackmagic RAW: Eats, Shoots & Leaves

Select Blackmagic RAW in the URSA 12K Dashboard Menu.

Here, we choose Constant Quality Q0.



*Eats, Shoots & Leaves* is a lively book about proper punctuation.

It reminds me of Blackmagic Design's design. Having democratized shoot, edit, grade and other once-expensive endeavors, Blackmagic has democratized working in RAW. Shoot RAW, Edit RAW, Eat healthily while you Grade in RAW, Finish in RAW, and then Leave happily.

Blackmagic RAW is a new codec that is easy to use, has small file sizes with the speed and ease of familiar video formats, and gives you the advantages of having the digital negative built in.

It makes life salubrious from set to sitting in the post-production place. There's just one file per shot, with a single file name (.braw). Data is not "wrangled." It is managed simply.

Blackmagic RAW codec incorporates the latest non-linear 12-bit Blackmagic Design Generation 5 Color Science. It offers pleasing skin tones and a filmic look. Blackmagic RAW files contain metadata with ISO, white balance, exposure, contrast, saturation and other settings. These settings can be summoned up in post and adjusted.

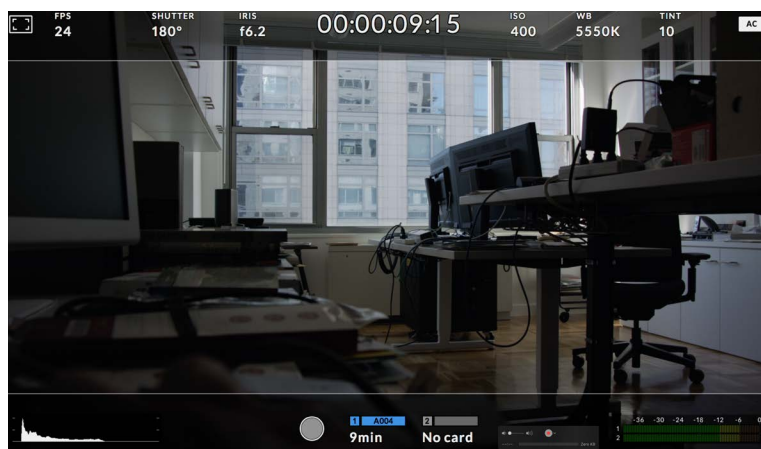
Gone are the days of editing with one set of transcoded "workprint" files, and then having to grade and conform another set of RAW files in post.

The Blackmagic URSA Mini Pro 12K camera comes with Blackmagic RAW. ProRes and Cinema DNG are still available. But, several weeks of testing convinced me that Blackmagic RAW is what I would choose almost all the time.

Blackmagic Design representatives explained, "Typically, RAW files are large and slow. Blackmagic RAW provides excellent image quality, wide dynamic range and a good selection of compression ratios. Blackmagic RAW files are very fast because part of the de-bayer is performed in the camera where it can be hardware accelerated. When the files are opened for editing and grading,



The 2nd page of the RECORD Menu offers choices of Dynamic Range: Video, Extended Video or Film. We chose Film.

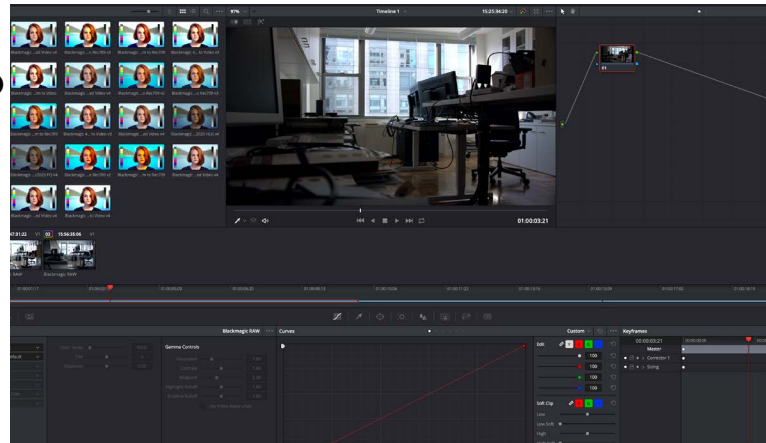


❶ OK, let's shoot some tests. Here's a framegrab from the URSA Mini Pro's SDI output to an external monitor. I'm shooting Blackmagic RAW, FILM style Dynamic Range, ISO 400, Messy FDT Test Area.

# Blackmagic RAW, cont'd



2



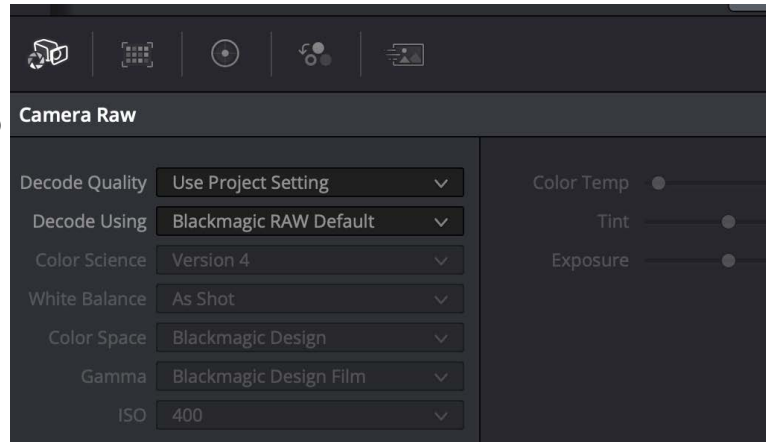
2 Above, we have ejected the CFast 2.0 media card from the URSA Mini Pro and copied the RAW .braw files to our Mac running the latest version of DaVinci Resolve 15. The RAW files play, edit and grade effortlessly.

3 At the lower left of the COLOR page of DaVinci Resolve, click on the icon above "C" of Camera Raw. We selected "Decode Using Blackmagic RAW Default." And clicked on one of the Blackmagic LUTs in the upper left side of the COLOR page.

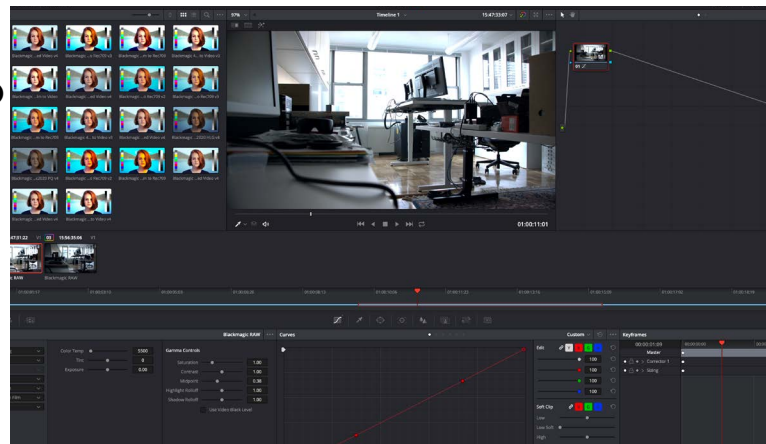
4 What happens if we want to shoot with Video Dynamic Range? I deliberately overexposed the windows and they are horribly washed out.

5 Blackmagic RAW to the rescue. Select "Decode Using CLIP." Adjustments that were grayed out in the RAW Defaults mode are now available. You can adjust ISO, reduce exposure, preserve the highlights, etc.

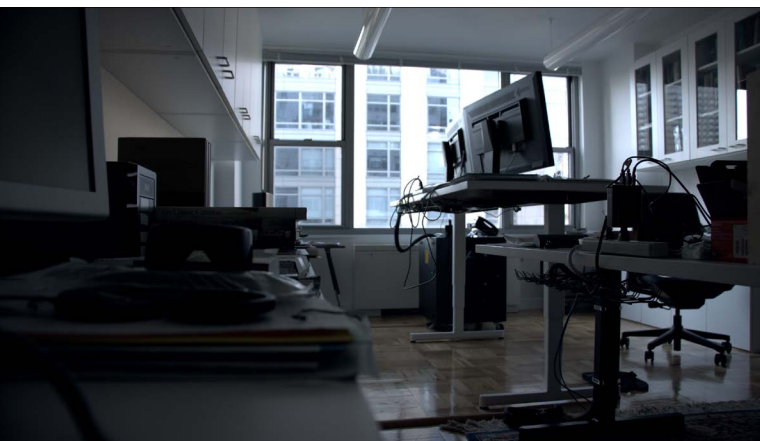
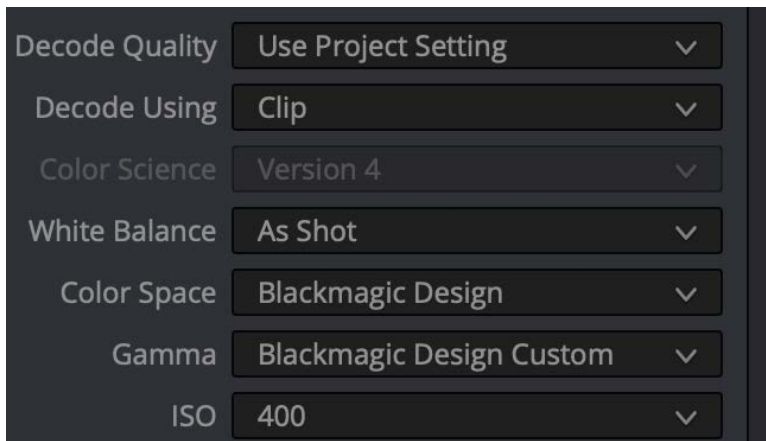
3



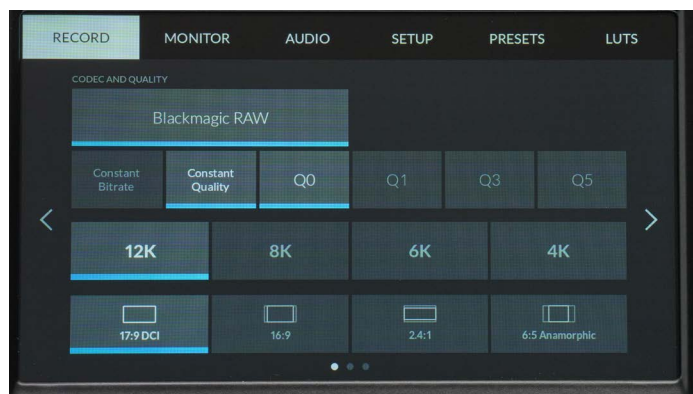
4



5



# Blackmagic RAW, cont'd



Blackmagic RAW Constant Quality: Q0, Q1, Q3 and Q5.

software like DaVinci Resolve doesn't have to do as much work decoding the files and you get noticeably improved performance."

Blackmagic RAW has two types of file compression. You can shoot with constant quality or constant bitrate. I recommend Constant Quality Q0 for the highest quality on high-end production.

Constant Quality (Q0, Q1, Q3, Q5) is a friendlier name for variable bitrate encoding. File sizes grow and shrink depending on the scene. Complex scenes, like motion control product shots of a fine watch, are encoded at higher data rates to preserve detail and quality. Blackmagic RAW Q1 to Q5 use moderate quantization for lower bitrates and smaller file sizes.

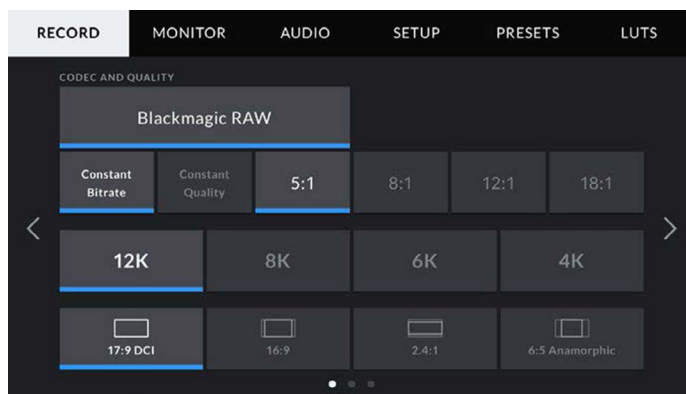
One caveat: it is possible to shoot something and the file size might increase beyond the capability of your CFast 2.0 card. This could result in dropped frames. However, there's a RECORD menu setting to stop recording if frames are dropped.

Blackmagic RAW Constant Bitrate choices are 5:1, 8:1 and 12:1 and 18:1. File sizes are predictable and file sizes are consistent. The ratio refers to the amount of compression. So, 5:1 means that the file is 5 times smaller than if it were uncompressed. And 12:1 means the file is 12 times smaller than uncompressed. 5:1 has the best quality and largest file sizes. 18:1 results in the smallest file sizes.

In summary, Q0 would be the setting to get the best quality. Its variable bitrate changes depending on the complexity of the scene but never compromises the quality. Bitrates will range from below 2:1 (for a scene that's difficult to compress) and could go up to 6:1 or 7:1 for a scene that's simple to compress. Q0 averages around 3:1. The image quality never changes, no matter how much movement or fine detail you have in the scene.

Blackmagic RAW simplifies and speeds up post production. The latest version of DaVinci Resolve fully supports Blackmagic RAW. Files play back immediately, even in 12K, seamlessly. DaVinci Resolve performance with Blackmagic RAW is much faster than, for example, Cinema DNG RAW. As mentioned before, one shot in Blackmagic RAW results in one .braw file. One shot in Cinema DNG RAW results in a folder with many files that are a sequence of still images.

When the RAW settings are changed in DaVinci Resolve, a .sidecar file can be generated or updated. When opened in other software applications that support Blackmagic RAW, the .sidecar file, which contains the RAW settings made in DaVinci Resolve, will be automatically used to display the image. If the .sidecar



Blackmagic RAW Constant Bitrate choices of 5:1, 8:1, 12:1 and 18:1.

file is removed, the file will be displayed using the embedded metadata instead. This gives you a non-destructive way to change RAW settings while working with different applications.

## Blackmagic RAW Player

The Blackmagic RAW Player is included when you download the free URSA Mini Pro or DaVinci Resolve update. It's an excellent and simple application to quickly review and visually QC shots at full resolution. Blackmagic RAW Player opens when you double-click on a .braw file. The viewer is currently ready for macOS.

## Blackmagic RAW SDK

The free Blackmagic RAW Software Developer kit (SDK) is available for Mac OS, Windows and Linux. If you are a camera or lens manufacturer or software developer, it is helpful to know the details of Blackmagic Design sensor profiles and color science. The protocols are being shared openly. Developers get access to GPU and CPU accelerated algorithms for decoding files, along with information about the camera's image sensor so their applications can decode and display the files.

## Metadata

The SDK includes many metadata options. Metadata is embedded directly in the .braw file or it can be stored in a .sidecar file containing the RAW settings as well as camera and lens information: lens model, focus distance, iris, zoom, focal length, white balance and more. The camera received lens data via the pogo pins in the EF lens mount or the PL mount for /i. Lens data can also be captured through the Hirose connector on the camera's front when using PL and B4 servo zoom lenses from Canon or Fujinon.

The .sidecar files can be used on top of the embedded metadata without overwriting it. Blackmagic RAW also supports frame-based metadata. This is important in VFX work and match-moving, for example when tracking focus distance frame by frame on a dolly shot when the hero actor is blocked by a foreground dinosaur.

Grant Petty, Blackmagic Design CEO concludes, "Blackmagic RAW is a modern, high performance, professional RAW codec that is open, cross platform and free. Blackmagic RAW has been designed to provide the industry with an open, elegant and standardized high quality image format."

Go to the Blackmagic Support website to check for DaVinci Resolve, Blackmagic Camera and Blackmagic RAW updates. They can be downloaded free: [blackmagicdesign.com/support](https://blackmagicdesign.com/support)

# Blackmagic URSA 12K



Huzzah. John Brawley and *The Great*



John Brawley with "The Football."  
Photo: Andrea Pirrello © Hulu





John Brawley with "The Football."  
Photo: Andrea Pirrello © Hulu

*The Great* is a bawdy farce streaming on Hulu, with Elle Fanning as the Empress of Russia and Nicholas Hoult as the Emperor. John Brawley was the cinematographer on 5 of the 10 episodes. John used a Blackmagic URSA Mini Pro 4.6K G2, the URSA 12K's predecessor.

**Jon Fauer:** *The Great* looked great. "Huzzah," as they often exclaim in the show. Would you please give us some background.

John Brawley: I appreciate that. We wanted to say to the audience, "This is not your normal costume drama, this is something else." Tony McNamara, the creator, writer and producer, would often say, "It's not a historical drama. It's punk history, it's anti-history."

It even says at the beginning, "An occasionally true story." And that's really to take away your expectation that what we're doing is telling anything close to a historical version of the truth.

**Tony McNamara was also writer and producer of *The Favorite*. *The Great* might be pitched as *The Favorite* meets *Animal House*?**

Tony described *The Great* as being about a woman who wakes up and realizes that she's in a really bad marriage. And she's living in something like an apartment block, which is what the palace is, with all the neighbors knowing her business and getting involved in it. That was the metaphor.

The idea is that this is like a frat house or a share house. It's in bad condition. He told the set dressers, "There should be more broken stuff on the floor. There's got to be more graffiti on the walls." Yes it was a royal palace, but it was run poorly, it wasn't kept well. There were food scraps in the corner.

He wanted it to be truthful even though it wasn't factually correct. It was an attempt at an honest approach on what it was, not glamorizing it. Many of these period shows have perfect costumes and perfect staging. We wanted the imperfections, the rawness, rough looking, a bit haphazard and unplanned. That was some of the logic to it.

As an example of those imperfections, if you look at Count Orlo's

glasses, they're crooked on his face; they're not perfect frames.

We tried to be contemporary in the way we shot it, and the way we covered it. We wanted it to feel like you're watching a contemporary show, but it just so happens that they're wearing all these big, flowy dresses and they're in a grand palace.

One of our unofficial rules was very few crane shots. There aren't many big, swoopy moves compared to most costume dramas. We did not fill the sets up with smoke. In fact, we decided not to have hazy interiors. Admittedly, there's a bit of natural atmosphere that happens because we've got 150 candles in the room, but we didn't add any atmosphere to whatever was there naturally.

**We'll get to candles in a few minutes. But first, what camera and lenses did you use?**

We shot with ARRI ALEXA SXT and Blackmagic URSA Mini Pro 4.6K G2 cameras, with Cooke S5/i and ZEISS Super Speed lenses.

*The Great* is a satirical piece. It's kind of anti-history. Tony McNamara, the show runner, wanted something light in treatment. Not just in terms of visuals, but overall tone, which is really important. This is the fourth show I've done with Tony. He's Australian, as well.

We talked about exploring options, cameras and lenses. Cooke S5/i are interesting lenses. It took me a while to get a grip on where they worked really well. For the first two weeks, I was shooting at about T2.8. But then, I realized that I was shooting wide open at T1.4 with the actor about six feet away from the lens. All of a sudden, something magical happened. Unfortunately for my focus pullers, I was now mostly shooting wide open, no matter which focal length. The Cooke S5/i looked fantastic at that sweet spot.

**Were you shooting RAW on the ALEXA SXT and the URSA Mini Pro 4.6K G2?**

Yes. We shot ALEXA SXT 3.4K ARRIRAW, framing 2:1 aspect ratio. On the URSA Mini Pro 4.6K G2, we shot Blackmagic RAW.



Photo © Hulu/  
MRC Television

But it was shot full sensor 4.6K, 2:1 aspect ratio, at 3:1 Constant Bitrate, which is their highest quality encoding. I would say that about 70% of the show is ALEXA SXT and 30% was the URSA Mini Pro 4.6K G2, or the G2 as I would call it.

### When did you shoot with which camera?

The ALEXA SXT was for what I'd call our regular, vanilla coverage where we shot the scene as blocked and staged. While the SXT takes were going down, I was observing the action, what the actors were doing, and I made a checklist of the action.

Then, we would shoot what I called our seasoning or condiments pass with the G2. It was for the less conventional coverage because the camera is so small. Essentially, we shot free-form, for want of a better word. It was like visual jazz or improvised operating.

If you do it at the end of the ALEXA SXT takes, when the actors have already expended themselves, they tend to throw it away a little bit more and you can get very loose. Interesting things can happen. We'd run a couple of takes and I would jokingly say to the actors, "I'll go to whatever's good. If you're interesting in this take, I'll be on you." I tried to make it a bit competitive with them. They actually started performing to camera. It gives you a very hyper-subjective style of coverage. It's very effective when you want to try and show if a character's going through some internal process. It gives you great transparency and insight into what the character's thinking. There are several charged moments. It's a great way for the editor to cut to a shot that will give you that energy.

Sometimes I'd stop and start within the take to get 14 different shots in a very short amount of time. They do not look like regular TV coverage. They're very unconventional shots that you'd never have time to set up specially, but I can find them very quickly in the moment by being able to move the camera around. Because the G2 camera is so small and light, I can use the built-in monitor screen and flip or tilt it up and down and move it around. I can get a huge variety of shots.

When I was in the United States on previous shows, the American

crew nicknamed it "the Football" because it's almost shaped that way and I carry it under my arm as you would carry a football. The actors enjoy doing a "Football" pass because they know that they can play to the camera. It's a lot like having an audience. They're aware of where the camera is. The camera operator becomes part of the performance. It's an interesting way to get unique coverage. What I love is it's very quick. It doesn't cost you any extra time and it gives you extra shot variety. Some of the most important shots in the whole show are shot with the G2. The camera is inexpensive but it does produce amazing results.

In short, the idea is to provide overlapping coverage. We would shoot the scene in a regular way with the SXT, and then we'd go back and overlap the coverage with the G2. Then the editor could choose to use it or not. It often works and has great energy about it when you use it. We had no issues inter-cutting. It's pretty seamless. Most people can't tell how many and which shots are which.

### Can you give us some examples?

Certainly in the episodes I shot (*The Beard*, *War and Vomit*, *Parachute*, *Love Hurts* and *The Beaver's Nose*), most handheld close-ups were probably shot with the "Football" pass using the G2. Many of the very important hero close ups on Elle were shot that way. At the end of *Parachute*, Episode 6, there is a good example where Peter says, "Science," and throws the dog off the balcony with a parachute.

It's actually the last shot of the show and that is a "Football" shot. When the dog and parachute land safely, Elle yells, "The future is bright. Huzzah!"

### Huzzah! What lenses did you use with the "Football" G2?

I have some old ZEISS T1.3 Super Speeds, which I like because they're so physically small.

### The matching seems seamless between cameras and lenses.

John Brawley:

I'm amazed as well. There are some scenes that were entirely shot



Photo © John Brawley / MRC Television

with the “Football” G2. Early in Episode 2, where the Empress is trying to seduce Count Orlo with oysters and she gets sick, almost all of that is shot with the “Football” G2. We had a lot to do that day and it ended up being faster to keep working handheld with quick resets.

### **How did you light the interior scenes with all those candles?**

This was the first HDR show that I have done. I spent a lot of time with our colorist, Paul Staples at Encore in London. He graded with DaVinci Resolve Studio, by the way.

I was trying to work out how to monitor on set. I’m not a big fan of the big DIT tent. And HDR monitoring is tricky in the field because I have not seen small, onboard HDR monitors. There are high brightness monitors, but I find they’re not giving me a true sense of the image precision that you get with the HDR image. One thing I realized quickly was that, although you’re seeing a lot of candles in the show, trying to keep them looking good and looking bright in HDR was actually quite tricky.

I ended up using a top-down approach. I’d use the candle flames to set my base exposure. As long as those candles in shot weren’t clipping, or near clipping, everything else fell into place below that. So, the candle flames had a nice orange glow most of the time as opposed to burning out to white. They still retained subtle skin tones and shadow detail. What’s great about HDR is all the complexity in the mid tones as well.

### **Did you light with lights or candles?**

I knew there would be many candles in shot, so we ended up using a lot of candles as practical lighting. We had double and triple wick candles. I think we went through 100,000 candles over the course of the show, would you believe?

I guess because the UK produces many period shows, I didn’t even have to ask for double and triple wick candles. The British art department simply presented their choices, “Here are the sin-

gle wick candles, the double wick candles, and the triple wicks.” I tested them, but they knew from experience that I’d want a mix. We ended up using the doubles most of the time in shot. They were more realistic.

The triple wick candles tended to appear crazy on camera. They looked like you had a giant bonfire going. I saved the triples for off-camera lighting. But they sometimes flickered weirdly.

Production even had a candle stick maker. The lead-time was about eight weeks and we definitely went through a lot of candles. A lot of candle power was going on in these candle-lit sets.

I also used candles even out of shot because some of the characters have glasses and you see the reflections.

### **Tell us more about the candles that you were using as lighting sources, not in the shot.**

We had some film-friendly candles with double and triple wicks that we could place near camera. It felt to me very authentic as a way of lighting. And sometimes I put silver reflectors behind them to project a bit more and increase the light level. An example of where candle reflectors were needed was in one of our location interiors. Four British Heritage people were watching every move we made. We were only allowed to have six candles lit at any one time.

Sometimes we had a few Astera tubes with a candle flame effect cycling on them. But they don’t quite look the same, especially if you look in someone’s eyes and you can see the reflection of the tube’s clean vertical line. It’s much nicer to see candle flames in the reflection.

I also used a lot of tungsten lighting. Most of the show, other than the pilot, from episode 2 to 10, was shot in sets on stage. Although we traveled to Italy for exteriors in Caserta, a giant palace south of Naples, even those interiors were shot on stage at Three Mills, in London. We used a lot of tungsten lighting fixtures because they



Photo: Ollie Upton © Hulu

look so beautiful for skin tones. LED lights are great, but when it comes to skin tones and beauty, I find they can have a kind of pallidness. I generally prefer to use straight tungsten. You might call it vintage or primitive lighting: T12s and 20Ks, and Maxi Brute 9-lights and 12-lights with 1K tungsten bulbs in there.

My favorite LED light is the DMG Lumiere from ROSCO. They've got a very good spectral emission, are light weight and versatile. Jean de Montgrand at DMG explained that they have six types of LEDs inside: Red, Lime, Green, Blue, Amber and White. That's why their color is so nice and I find them to be really good.

Between the candles and tungsten, it felt very old fashioned. Maybe for season two, I should try and drag out some brute arcs and use them as well. So far, my excellent gaffer Lee Knight has gone with me on my predilection for tungsten over LED and HMI but I'm pretty sure he might draw the line at arcs!

**Your lighting was elegant and dramatic. It complemented the story beautifully. It did not look like comedy, or should I say, satire lighting.**

Thank you. Traditionally, comedy lighting tends to be brighter and higher key and not as dramatic. Tony didn't want that. While he didn't want *Game of Thrones* dark lighting, he didn't want it to be tennis court lighting either. We still wanted to treat it like a drama. I had never thought of it as a comedy show. I knew that absurd things happened but it was never written for laughs in terms of slapstick, punch line or rim-shot gags. It was written as drama that has absurd moments of insanity that are funny in retrospect.

But really, we never tried to make it a funny show. Tony is a brilliant writer. There's a great rhythm. It's almost Shakespearean.

**Tell us more about matching ALEXA with G2.**

The looks, colors and dynamic range of both cameras were quite similar. They matched very easily, with not much tweaking required. In pre-production, we worked up a whole lot of tests to

create the look of the show with the showrunner and the producers. We talked about what it should look like and we distilled that into a look, as embodied by a LUT. There is a daytime version and a night version of that look.

Then we made a LUT for each camera: one for the ALEXA and another for the G2 so they both matched. When it went into the edit, everything looked seamless.

Certainly there were visual differences because of the way the cameras were operated: one was handheld and the other usually was not. In the final grading, we tried as much as possible to match to the dailies. We got very close in the final grade, and usually I could only tell by looking at the style of shot it was. Sometimes you could see slight differences in resolution, but that was the only difference.

**Filters on the lens?**

I used some very light Schneider Black Frost filters,  $\frac{1}{8}$  and  $\frac{1}{4}$  depending on focal length. This minimal amount of diffusion on both cameras was just to take a little bit of the edge off. As you know, Elle is amazing, she used barely any makeup, which again was a very brave choice that she made. Most of the cast also had very little makeup. Of course, they have big wigs and hair pieces.

**Were you viewing on set with HDR monitors?**

At one point, we looked into getting some consumer HDR televisions and turn those into a village. But it seemed clumsy and not very agile. In the end, the village didn't need to watch in HDR. It felt like shooting film.

The on-set monitor was like the workprint. You understood what it would look like in the final grade as long as you were careful in terms of exposure. You didn't have to see it in dailies to understand that it would be transformed and more beautiful than what you saw on set, because that was the process. I didn't fret about it. I knew that as long as I didn't over-expose, I was pretty safe. As mentioned earlier, I was often exposing to the candle flame il-



L-R, above: Director Geeta V. Patel, Writer/Producer Tony McNamara; and DP John Brawley. Photos: Andrea Pirrello © Hulu

lumination levels. With HDR, I tended to protect the highlights more, letting everything else fall below that, and trusting that the dynamic range of the camera, whether ALEXA or G2, would be able to lift those areas back up. And they did. I thought it worked well as an approach.

### Did you operate yourself?

Usually only the “Football” shots with the G2. We had two wonderful operators, Jessica Clarke-Nash as our B-camera Operator, and James Layton on A-camera and Steadicam. So, I would sometimes come in at the end with the G2, but only because it’s very improvisational and driven by performance, with the cues and timing coming off the actors. The other operators could do it but it was something I enjoyed doing myself to dip my hand in it, so to speak.

I was using the built-in monitor of the G2 camera. That’s what makes it so cool, because the camera’s really tiny and, like a Handy cam, you can hold the camera with one hand. It’s light enough that, for example, I could look straight down on a table and if I held the monitor with the other hand, I could pivot the camera and look straight up. That could happen in shot, which was a very flexible way of shooting.

If you add in the fact that I could swing my arms around, or crouch down low and then hold it high above my head, you got a lot of shot and lensing variety by being able to move around so freely. The camera is not stuck on your shoulder. That is why this style of coverage was kind of unique.

### I vaguely remember you were born in New York.

The backstory is my mum was a hippy. She was in New York in the late '60s and the early '70s, and went to Woodstock. I was of product of that era and I was born there. Then my mum ended up going back to New Zealand when I was about 12 months old, so I grew up in New Zealand until I was about five, and then we moved to Australia after that. So, I identify as Australian but technically I’m an American.

### A child of Woodstock. Far out.

Haha, definitely she would say that. I’ve got great pictures of my mum sitting in trees at Woodstock and hanging out. She was the real deal.

### And how did you get into film?

Photography was always something that was very interesting to me as a kid growing up. It was the first hobby I found where I didn’t get bored because it was a great way to combine other interests as well.

I started doing photography when I was very young, I had a great art teacher in primary school. He taught me to take stills, how to print and process black and white film.

I grew up mostly in Melbourne. I did a lot of photography when I was a kid and I loved what a camera could do. At that time, the first Gulf War was happening. There were a lot of protests and I could use my camera to get access. I was also doing live music photography. I was in pubs, shooting bands. I was underage. I wasn’t even meant to be in there because I was 15 years old, taking photos of bands late at night and during the day when I was supposed to be at school. Half the time, the bands were my music teachers.

At university, I started in media and photography. But, it had a cinematography component and I was hooked at that point. I shot some film on an ARRI ST and became addicted to the moving image at that point. So, that’s where it began.

Cinematography is a great combination of science and technical knowledge in the service of a creative outcomes. It is endlessly fascinating to me and continues to give me great joy.

### This has been a fascinating talk. Great work. Huzzah.

Huzzah. That’s right. We were all hoping that we’d get some vodka glasses at the wrap party so we could smash them and all say, “Huzzah.”

## Paul Staples on Grading *The Great*



**Paul Staples**, colorist at *Encore in London*, comments:

John and I worked on setting LUTs during prep. I loaded the ARRI and G2 Raw test files into a DaVinci Colour Managed project, took stills, then repeated the process into a non DaVinci Colour Managed project timeline and matched them to the DaVinci Colour Managed project stills. The show project was UHD Dolby Vision HDR P3 at 23.98 fps.

We used DaVinci Colour Managed colour science which is within the DaVinci Resolve Studio software. I then produced LUTs for both cameras that would be used on set and in editorial. When it came to the grade, we worked in a DaVinci Colour Managed project and I pasted a saved correction node which contained all the

parameters to match. This worked extremely well, and brought the two cameras within a hair's breadth, giving me continuity across the timeline. With the help of DaVinci Resolve Studio's collaboration mode, this could be looked after in pre-grade, which really helped as the shows had a very tight turnaround schedule.

In the grade, we used a pared-down HDR show LUT. This was only a base to get continuity across the timeline. I wanted maximum flexibility to bring the nuances of the work out and not suffocate it with a heavy aggressive look straight out the box, and also to still maintain a look continuity conducive to the showrunner's brief and, of course, the look that series DP John Brawley sought.



# John Brawley and The Great New 12K Camera



Photo by Jessica Clarke-Nash.

July 16, 2020. Melbourne, Australia. Grant Petty introduced the latest Blackmagic Design URSA Mini Pro 12K. It has a 12,288 x 6,480 12K Super35 image sensor, 14 stops of dynamic range, and shoots up to 60 fps in 12K at 80 megapixels per frame as well as 8K up to 110 fps, and 4K DCI full sensor up to 110 fps.

Grant said that Blackmagic Design was aiming for the high end with this affordable camera. “It’s not just the 12K sensor, but so many other innovations...Generation 5 Color Science, in-sensor scaling, new symmetrical color pattern and 12K resolution. It’s going to be exciting to see what cinematographers do creatively with this technology.”

One of the first cinematographers to try it was *The Great John Brawley*. His demo footage showed silky smooth skin tones, gorgeous color and low to no noise. ([vimeo.com/436209544](https://vimeo.com/436209544)). Brawley said, “The picture quality is fantastic. And the 12K Blackmagic RAW footage that I showed you was cut on my 2017 MacBook Pro with a standard drive.”

## 12K Super35

The sensor is 27.033 mm wide x 14.246 mm high. The pixel pitch is not published yet, but if you divide 27.03 by 12,288, you get approximately 2.2 microns. That’s tiny, and yet the URSA Mini Pro 12K has 14 stops of dynamic range and a native ISO of 800. How do they do this?

The sensor does not have a typical Bayer pattern. Grant called it a symmetrical sensor pattern. John Brawley writes, in his *Ramblings of a Cinematographer* blog, “Blackmagic’s 12K sensor uses a brand new custom filter array that has an equal number of red green and blue photosites as well as the addition of clear or ‘white’

photosites. It’s like HDR images can be created by combining two brightness values, so we can now combine the brightness and extra sensitivity of the W photosites along with the color pixels to get an extended dynamic range, helping to overcome the issue of making these new better pixels so much smaller.

“Normally reducing the pixel size to be so small means the light sensitivity is sacrificed, but this is more than compensated for by using the unfiltered W pixels. By combining the brightness values of those W photosites with the colored photosites, it also greatly increases the dynamic range compared to a standard Bayer array.” ([johnbrawley.wordpress.com](https://johnbrawley.wordpress.com))

Brawley clearly has a Melbourne origin home-team advantage and impunity when he continues, “The 12K camera is a result of three years of work on a custom sensor design. Think about that for a moment. BMD threw millions of dollars at developing their own 12K sensor three years ago, from scratch, when you would struggle to even get 8K. Somehow they managed to keep this a secret for all that time. While BMD have highly customized and adapted other sensors previously, this is the first sensor that BMD have designed completely from scratch with their own IP and design... and I think shows their ongoing maturation as an imaging company.”

So, Blackmagic Design designs the 12K sensor, builds the camera, implements Blackmagic 12-bit RAW and drives DaVinci Resolve. That’s pretty much the entire imaging food chain within their grasp. That’s compelling.

Another nice thing about the sensor is that you can scale the image from 12K to 8K or 4K without cropping or binning. You can shoot the same scene with the same lens and field of view.

# URSA Mini Pro 12K



composite rendering



If it's windowing one wants, dust off those cherished Super16 lenses and shoot in Super16 format at 6K up to 120 fps or 4K up to 220 fps.

The camera comes with a PL mount. You can swap it with optional EF or F mounts. There are built-in ND filters, CFast and UHS-II SD media slots. The USB-C connector, with 10 Gb/s data rate, lets you attach an SSD or NVMe drive. The BNC connector at the front camera right side provides HD SDI (up to 3G) and the rear BNC provides 4K SDI (up to 12G) output.

Bob Caniglia, Blackmagic Design Director of Sales Operations, North America, explained efficiencies of 12K: "On its own, 12K is obviously a huge number. In order to shoot 12K or 8K or any of these larger formats, you truly need to be able to use it. One of the challenges set out from the start of this project was to be able to have hardware over-sampling to make 8K files or 4K files from the 12K files, but to be able to do it without requiring a supercomputer.

"It was a combination of our managing the color science, having Blackmagic RAW, developing the sensor and having DaVinci Resolve Studio (included with the camera) on the back end to deal with the files. For example, this camera enables you to shoot 12K plates for VFX. For 8K or 4K, the camera does in-camera hardware scaling. And, if you're shooting vertical video, you get a 6K vertical format.

"The UI is familiar to users of our other cameras. There's constant quality and constant bit rate.

"**Constant bit rate** is a defined compression of 5:1, 8:1, 12:1 or 18:1. The bit rates vary. 12K 5:1 at 24 fps is close to 600 megabits

per second. 18:1 in 12K at 24 fps gets it down to 160 megabits per second.

"**Constant quality** choices are Q0, Q1, Q3 and Q5. It means shooting with the best quality and varying the compression depending on the scene. If I'm filming you in front of a blank wall, it can use a lot more compression to compress those areas because there's nothing else going on in the background. Whereas, if you were running down a street, it would require less compression to get that quality because there's a lot more fine detail.

"In Q0, the highest quality, your bit-rate could be anywhere from 241 megabits per second to 578 which is compression of anywhere from about 5:1 to 12:1, depending on the scene. When you get to Q5, that's constant quality with the most compression, anywhere from 72 to 180 megabits per second."

## BLACKMAGIC URSA Mini Pro 12K Summary

- 12,288 x 6480 12K Super35 sensor.
- 14 stops of dynamic range and native 800 ISO.
- Real-time Blackmagic RAW 12K editing.
- Up to 60 fps in 12K, 110 fps in 8K, and 220 fps in 4K.
- Dual card CFast recording at up to 900MB/s.
- PL mount included; EF and F mounts available.
- USB-C for recording up to 10 Gb/s to external disks.
- Includes DaVinci Resolve Studio for post production.
- Compatible with new Blackmagic URSA Mini Recorder.
- 5.92" W x 9.2" L x 5.78" H; 5.62 lb.
- Blackmagic URSA Mini Pro 12K will be available soon for around US \$9,995, excluding duties or tax, from Blackmagic Design resellers worldwide.

Blackmagicdesign



11 Gateway Court  
Port Melbourne VIC 3207  
T: +61 3 9682 4770  
[blackmagicdesign.com/company](http://blackmagicdesign.com/company)

**FILM AND DIGITAL TIMES**

Special Report  
© 2021 Film and Digital Times  
[www.fdtimes.com](http://www.fdtimes.com)