

BLUE ONE, TWO, THREE



ARRI OV-Plus Camera with Optical Viewfinder

A few weeks ago we lurked around Türkenstrasse, like a stealthy automotive journalist with giant telephoto lens at the test track, in the hope of either spotting the new beasts or benefitting from rumors in one of the beer halls near ARRI headquarters. But secrecy was tighter than a closed studio set, and the collective ears and antennae of Clairmont, Nemenz and well-connected rental houses worldwide were beginning to wonder what they were up to in Munich.

The following article and engineering drawings are not necessarily the definitive word on these new cameras, which are works in progress.

However, knowing ARRI, I would expect working pre-production models at NAB.

Three New Digital Cameras from ARRI

Stop the presses! Blazing Headlines: Not One but Three New Digital Motion Picture Cameras from ARRI, the company with the Blue Logo. Just when we thought it was safe to consecrate these pages to press, the phone rings amid a torrent, *no...a cascade*, of pictures, text, and information that not only changes this entire issue but also has the potential for changing the nature of digital production.

We had heard cries and whispers about a new camera for a long time. But—*bango!*—*just so!*—faster than you can say “Tom Wolfe,” three new cameras, code named ALEXA, make their stunning debut at IBC. The screenplay of the story would imagine down-to-the-wire meetings in which the corporate tradition of unveiling no camera before its time, or it’s time, weighs mightily against the ticking timeline of an arena in which life cycles (not these) may be more like butterflies, and camera specifications, prices, and delivery dates are more enigmatic.

I doubt whether ARRI will conduct a competition for cinematographers to name the three new cameras. So, until they get a real name or number (D-31?), perhaps we can call them BLUE, after ARRI’s Pantone Blue logo, True Blue Lights, Blue States, Jetblue, Terra Blue Chips, Blue Ribbon, or Blue Plate Special. ALEXA is a good name too. It reminds me of Billy Joel’s song *The Downeaster Alexa*, from his *Storm Front* album.

EV, EV-Plus and OV-Plus

But we digress. The three new ARRI BLUE digital cameras being announced at IBC satisfy the holy trinity of contemporary production: lighter, smaller, faster, cheaper. Wait, that’s four: a superfecta—even better than a trifecta.

The three cameras are compact, lightweight, affordable and intended for every level of the broadcast and feature film food chain. Prices start somewhere below € 50,000. The two entry level models (EV and EV-Plus) use a new ARRI electronic viewfinder and a 16:9 picture area. The bigger-budget production camera (OV-Plus) will have an

optical viewfinder, and will continue ARRI’s legacy of offering a 4:3 sensor with a rotating mirror shutter. All three cameras will shoot 1-60 fps. The Plus models will have integrated wireless remote control for lens and camera operation.

It typically took 18 months from first whisper-room glimpse to actual production, but I’ll bet they’re working overtime on Türkenstrasse, because estimated arrivals are June 2010 for the EV, September 2010 for the EV Plus and December 2010 for the OV Plus. Early adopters and owners of ARRIFLEX D-21 cameras will get first dibbs on the OV-Plus, and will even be offered an upgrade trade-in path. Dare we call it cash for cameras?

All three BLUEs use a single 35mm format, totally new CMOS sensor that promises higher sensitivity and dynamic range (wider exposure latitude) than what we’ve used before. They have the same depth of field as 35mm film cameras and accept all 35mm PL mount lenses, including anamorphics. All three cameras have a base sensitivity of 800+ EI equivalent. Output options include on-board recording and multiple live HD and ARRIRAW feeds. The cameras’ electronics are completely sealed for working in hostile, hot, wet, cold or miserable environments.

ARRI Electronic and Optical Viewfinders

As we’ve seen with the D-21, some camera operators love it and others don’t, but one sure thing is that optical viewfinders add cost, complexity and weight. So now you have a choice. For the entry-level cameras, ARRI will offer high resolution ARRI Electronic Viewfinders. They use FLCOS (Ferroelectric Liquid Crystal On Silicon) microdisplay technology, with an image area of 1280 x 720 pixels. The optical design and coated glass optics provide high contrast and low distortion with an evenly illuminated viewing area. The auto-calibrating, temperature controlled LED light ensures true and reliable color representation over a wide variety of operating conditions.

Because the sensor of the EVF-equipped cameras is full-frame 4:3, and the recorded image is a smaller 16:9 frame within, the electronic



ARRI FLCOS Electronic Viewfinder (EVF)

viewfinder can display an over-scanned viewing area that surrounds the frame, so you can see microphones creeping into your shot and C-Stands lurking at the edges. Zoom and other options are available to help you to judge focus and exposure. The small, self-contained finder is easily mounted in different positions: on the side for handheld, or in back for use with a geared head.

ALEV III Sensor

I'm not sure why camera designers are naming their chips after people or conjugated Cirque du Soleil shows. ARRI's sensor is anthropomorphically anointed ALEV III. Is ALEV III the third monarch in a dynasty of distinguished silicon wafers, half-cousin of the ever-popular ALEXA? The new sensor is a 35 format, single CMOS, Bayer mask device with a 3.5K pixel count. ARRI's imaging technology consists not only of ALEV III, but also his entire entourage, including a high performance optical low pass filter pack, a powerful hardware imaging engine, advanced image processing firmware and a number of unique image processing steps.

Pixel Size and Pixel Count for HD and 2K DI

A camera and sensor designer's goal, in addition to cute names, is to create cameras capable of images that look great, balancing sensitivity, latitude, color, and image sharpness. Therefore, pixel size and count have to be carefully considered.

ARRI is positioning these digital cinematography cameras for HD television, commercials and feature films whose current output formats are HD 1920x1080 or 2K data. ARRI feels that uncompromised and uncompressed 4K resolution, will remain the domain of 35mm film for some time to come.

I wasn't buying this until I noticed what was happening in the digital still camera world. A funny thing happened on the way to the trade show. The pixel race is slowing down. Look at the recently introduced Canon G11 digital still camera. At 10 megapixels, it replaces the previous model, G10, which boasted 14.7 megapixels. But the new camera

is twice as sensitive (ISO 3200) and offers two more stops of performance.

Image quality is affected by pixel size: larger pixels have a higher sensitivity and wider latitude, while smaller pixels provide better resolution with smoother stair-step edges. In addition, larger pixels output at lower data rates and can handle data more efficiently in the camera. Using larger pixels means that BLUE does not have to use data compression for its ARRIRAW outputs, and can provide uncompressed and uncompromised image quality.

In designing a single 35mm format 3.5K sensor with HD/2K output for the BLUE cameras, 8.25 micron pixels were selected. (Your hair is about 50 microns thick.) Think of sensors as buckets sitting out in the rain, and pretend the rain is a stand-in for photons of light. The larger the bucket, or sensor, the more light can be gathered. The smaller the bucket, the more buckets can be placed side by side (higher resolution), but they can't hold as much. From this 3.5 K sensor, the new cameras generate images in HD or 2K. It does this through oversampling, which means that more pixels are captured by the sensor than are required for the output format, and the image is downsampled by the image processor. For example, 2880 x 1620 sensor pixels are downsampled to 1920 x 1080 for HD output, and 3072 x 1728 sensor pixels are downsampled to 2048 x 1152 for a 16:9 2K DI. The A-OV Plus camera will be able to use even more pixels for 4:3 formats, with its total sensor pixel count of 3392 x 2200.

The way the camera manages to have a wider "exposure latitude" is with two 14 bit A/D converters that deliver separate high and low gain signals that are then re-combined into a single 16 bit high dynamic range image. This is very similar to the way the ARRISCAN works, exposing each frame of film multiple times for highlights and low light areas.

I'm looking forward to working with the new digital cameras from ARRI, and finding out what their real name will be.