



# Raw Data and Video Signals

The ARRIFLEX D-20 originally was designed to be a raw data camera. As, at the time it was introduced, no infrastructure existed for handling raw data, ARRI focused on maximum quality HD video output. By now, a lot has changed regarding raw data processing, which is the reason for the re-incarnation of ARRIRAW/data mode with the ARRIFLEX D-21.

Video signals are subject to a number of restrictions, such as a predefined bit depth, resolution, frame rate and specified signal transmission interfaces. This is not to say that video signals are something bad. The image quality the D-20 provided on its HD output was able to convince many customers. As the improvements of the image processing chain of the D-21 reflect in both raw data and HD output, the camera will be able to continue providing its cinematic image characteristics for many HD productions.

## ARRIRAW

### Benefits

The use of raw data, along with a higher bit depth, offers the advantage of higher resolution output, which is especially relevant to feature film production or the creation of feature film elements.

- Choice of contrast characteristics after the image has been recorded
- Full 1.33:1 (4:3) format image capture using 2880 x 2160 pixels up to 25 fps.
- High-resolution 1.78:1 (16:9) format image capture using 2880 x 1620 pixels up to 30 fps.
- Higher output resolution for the ability to reframe shots and higher quality than an HD blow-up when printed to film.
- Higher bit depth for more creative freedom in creating the intended look.
- Possibility to use existing anamorphic PL-mount lenses with a conventional 2:1 'squeeze' to produce CinemaScope images without reducing the vertical resolution. The D-21 can be fitted with an anamorphic finder.



The image, as recorded by the D-21 with an anamorphic lens

A simple 2:1 stretch and a slight crop from the sides in post results in a Cinemascope format image.

### ARRIRAW Processing

When shooting ARRIRAW, the camera delivers widely untreated sensor data, which has to be processed and output to an RGB image, before it can be viewed. As the RAW Bayer data only contains luminance information, ARRIRAW processing assigns one color component to each pixel, based on the CFA alignment on the sensor (see Single-Chip Imager). The image then contains three color components, but only one component per pixel. To obtain the remaining two color components for each pixel they have to be interpolated from the surrounding pixels ? i.e. color reconstruction. There are different methods for color reconstruction, which usually can be selected depending on

desired processing speed and output quality. Before the RGB image is ready for viewing, the colors need to be transformed to the desired output color space (e.g. for output on HD displays or for digital cinema projection) and the tonal balance has to be adapted using the intended contrast characteristic. The output RGB images are then stored e.g. as 10bit log dpx-files, 16bit tiff-files, or other file formats, depending on the hardware or software used for ARRIRAW processing.

ARRIRAW data can be processed in production quality using ARRIRAW Image Converter.

## **ARRIRAW T-Link Recording**



The D-21 outputs ARRIRAW using an HD-SDI connection. In order to get the data through these channels, it has to be mapped into an RGBA (A for alpha channel) HD-SDI stream (according to SMPTE 372M). The output signal (T-Link) resembles that of an uncompressed 4:4:4:4 1080 HD signal. ARRI is offering a program, which allows data recorder manufacturers to have their devices certified for ARRIRAW recording. Certified devices, aside from basic recording, provide advanced functionality of live preview processing while recording and de-squeeze of anamorphic images for preview and playback. Manufacturers S.two, Codex and Keisoku Giken already offer an ARRIRAW T-Link certified device.



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