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## Seeing RED

### Raw Goes to the Movies

*It's always worth keeping an eye on what's going on in industries related to ones own, and this applies to video production as well as movie making. There is a revolution taking place at the moment which involves large sensor (12MP) CMOS video devices that shoot raw. Yes, raw video.*

*In late March, 2008, along with the Luminous Landscape's video producer Chris Sanderson, I had an opportunity to visit with Canadian Director of Photography Gregor Hagey, one of the early adopters of the revolutionary RED One camera system.*

*There are significant implications for the still photography industry in the RED One and its kin, so if some insights into the future of our industry is of interest, read on.*



*Gregor Hagey and Chris Sanderson discuss the finer points of RED*

Just as digital technology has revolutionized still photography, so too video production. But, to a large extent movie making has remained film-based, due in large measure to the so-called film *look* that so many people find to be lacking in contemporary digital video cameras. While fine for TV production, including documentary work – which has already largely gone digital, feature film production has been slow to embrace digital.

One analogy that helps us understand why is that digital video is similar in many ways to shooting JPGs. Such images are essentially "baked" and subsequent *grading* and *timing* (industry terms for what we photographers call colour correction and exposure-contrast-saturation adjustment) have limited leeway. Movies shot on colour negative film offer a much broader capability for refinement and adjustment and this in large measure leads to the so-called film *look* that so many admire, and which they pay a significant premium to obtain.

But this is now changing. A new generation of professional video cameras are appearing that shoot the video equivalent of "raw". Rather than producing a standard compressed video output, they produce what is essentially a raw file which then can be processed so that white balance, sharpening, and other parameters can be fully adjusted. Such raw video software records these changes as metadata, just the same as do the raw processing programs which we use on our DSLR files.

Until recently video cameras which offered raw capability cost many hundreds of thousands of dollars, and some weren't even purchasable; they could only be rented. But now this barrier is being broken, and one high-profile example is the RED camera from [The Red Digital Cinema Camera Company](#). You can read about the RED camera on their web site, and a very [comprehensive overview](#) is also available on [Wikipedia](#).

Briefly though, the RED ONE features a 12 MP CMOS sensor and has a base cost of \$17,000. This is deceptive, because this is for the camera only. Add a decent lens or two, batteries, hard drives, mounts and such, and one easily gets to between \$50,000 and \$100,000. Not cheap by any means, but also not anywhere near as expensive as the competition.

There are two raw processing programs available for it – **RedCine** and **RedAlert**. (*One of RED's software developers, Graeme Natress, is a regular on this site's discussion forum*). Think of a cross between **iMovie** and **Camera Raw** and you'll have a bit of a sense of what these are like.

The net of all of this is that movie makers now have digital video technology that provides them with image quality not just comparable to 35mm motion picture film, but which may actually exceed it. Just as a 12MP DSLR challenges drum scanned 35mm still film in terms of resolution, and exceeds it in several other areas, so too does the RED One when it comes to competing in terms of image quality with professional motion picture film. And if you've priced a roll of 35mm film recently, imagine what the tens of thousands of feet of the stuff needed to film a movie costs, let alone subsequent processing.

Just as raw still files are large, and take up a lot of disk space, so too with raw video, but orders of magnitude more. How about twenty four 12MB raw files every second? This requires *serious* bandwidth and storage. Rendering after raw processing then can take many hours, and requires some significant computing power.

**Sidebar:** REDCODE RAW, the wavelet based compression scheme brings this down to around a tenth of that size, and allows RED to record, if desired, 4 minutes of 4k quality on a 8GB compact flash card. (*4K means 4000 pixels on the longest dimension*).

Fortunately, raw processing is done using proxy files, and so it isn't till after all edits and corrections are made that these lengthy processing runs are required. There are even commercial firms called *rendering farms* which powerful banks of parallel computers that will handle this aspect of post production.

Several feature films have now been shot with the RED One, and more than you might imagine with some of the more expensive systems that preceded it. TV series, documentary productions, and numerous commercial have been shot with it. That's one of the reasons that one of Canada's largest equipment rental houses, [PS Production Services](#), has recently acquired ten RED One systems, and this is where we conducted our interview.

Since a review of the RED camera is beyond the scope of this site, if you are interested in learning more about this camera and its technology the links found in the [Wikipedia article](#) are the best place to start.

In mid-April 2008, just a couple of weeks after this article appears, a new hand-held raw video camera called **Scarlet** – based on RED technology – will be shown at the NAB show in Las Vegas. Price is reported to be in the range of a high-end DSLR. This opens up some very interesting possibilities for still photographers, which we'll explore in the next section.

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## Convergence

"So what does this have to do with me," you ask . "I'm a still photographer, not a movie maker or videographer."

Possibly more than at first meets the eye.



*Casio EX-F1 Hybrid camera*

There is a hybrid still / video camera called the [Casio EX-F1](#), which was introduced in early 2008, and which will start shipping at around the time that this article first appears in early April, 2008. (Yes – I expect to have a review it here before the end of April). Priced at about \$1,000, it looks like nothing more than a typical superzoom digicam, and with a 6MP sensor a digicam that appears uncompetitive compared to today's 10 – 12MP offerings in this market segment.

But what you'll discover is that this camera can shoot raw (DNG) as well as JPG, and can do so at the rate of 60 frames per second. It can also shoot full 1080i hi def video at 1920 X 1080. When shooting 6MP stills it can do 60 FPS, or any slower variation, such as 20 FPS for 3 seconds. In any event its limit at 6MP size is a maximum of 60 frames at a burst. When shooting hi-def video it is limited only by the size of the on-board memory card.

When you peruse the specs you'll see that this camera can even shoot motion video at up an astonishing 1200 fps, though resolution reduces to 336 X 96 pixels, more than adequate for the web and some scientific applications in motion study.

There's more to read in [the specs](#), and whether the *Casio EX-F1* really delivers adequate still and video image quality remains to be seen. At under \$1,000 though it is a definite harbinger of the future, and with Sony as the chip supplier its inevitable that this technology will start to turn up in cameras from other manufacturers as well since Sony is one of the largest sensor suppliers to the camera industry.

(Note that unlike the **RED** and **Scarlet** cameras, the video produced by the **EX-F1** is not raw. Only stills from this camera are raw. What do you want for under a thousand dollars?!)

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### Yet Another



Not to turn this into a laundry list of new cameras, but another that was announced in January, and which is due for release in May, is the [Samsung SC-HMX20C](#). Whereas the Casio EX-F1 is a high speed stills camera that can also shoot hi-def video, the Samsung is a solid state hi-def video camera that can also shoot stills. It appears to use the same Sony chip as the Casio, but that is just conjecture on my part.

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### Implications

Anyone who has bought a pocket digicam within the past couple of years will have noticed that they now almost all shoot video as well. The latest versions even shoot variations on hi-definition, (*though none to my knowledge full 1080i or p at the maximum 1920 X 1080 resolution till now*). Although video image quality is never as good as that from a dedicated video camera, and there are usually other limitations, such as the inability to zoom during shooting, this video capability has, for many home users, become an adequate substitute for owning a dedicated video camera.

But, now we have camera like the **Casio EX-F1** at the low end, the **Scarlet** in the mid-range, and the **RED** at the high end. Though not quite the same type of beast they are all pointing to what I believe will be an almost inevitable convergence of technologies – cameras which will shoot both high quality raw still images as well as high definition raw video, and sometimes additional capabilities such as extremely high frame rate stills as well.

Who needs this? Certainly not everyone. I can hear some people now muttering – "I don't need no stink'n video". We'll, *you* may not, but think about photojournalists and sports photographers. How about wildlife photographers? There are a great many purely still photographic applications where high frame rates will ensure getting an image that might otherwise be problematic. And there are instances where being able to shoot video as well as stills at the same time is a requirement. Indeed, some newspapers have already switched their photographers to shooting with still / video hybrids. This is being driven by the migration of newspaper publishing to the online world, where video is also in demand. I expect that this new generation of cameras, such as the **Scarlet** and the **Casio EX-F1**, will definitely appeal to this segment.

I don't expect convergence in the still photography / video arena to produce a single solution that fits

everyone's needs. There will continue to be still only cameras, and video only cameras. Tape is rapidly disappearing in video, just as film is in stills, and movie film has pretty much been relegated by now to high-end movie studio productions. But with raw capable cameras like RED, that too, as we've seen, is in transition.

I therefore expect that along with single application devices we will see hybrids that have primarily a still photography orientation, and those that are primarily video with stills capability as well.

For the consumer market though the convergence is already here. For many people their flat panel large screen plasma or LCD screen in the family room has become much more than just a TV. It's linked to their computer system through a device like the [Apple TV](#), which merges video on the net, music libraries, home videos, picture collections and the like. Many new cameras, including the latest DSLRs, feature HDMI connectors which allow them to plug directly into home entertainment systems. It's called **convergence**, and like it or not – its happening.

Some will bemoan this, feeling that the values of traditional photography are being lost. Maybe so. But whatever ones philosophy regarding the *purity* of still photography might be It's sure going to be interesting to watch how it all evolves over the next few years.

**April, 2008**

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