

EOS Immersion Seminars 2011: Class Notes

Part 3

EOS HD Video

Capture Basics



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I. Introduction

1. EOS HD Video Capture Basics

In September, 2008, the EOS 5D Mark II became the world's first digital SLR camera with Full HD 1080p video recording capability. Since then, the overwhelming success of this camera and its companion EOS models for video applications has shown that the 5D Mark II's HD video feature was a game changer for the entire photographic community, both manufacturers and users alike. An analysis of the popularity of HD-compatible EOS DSLRs including the 5D Mark II, 7D, 60D, EOS-1D Mark IV, Rebel T3i, Rebel T3 and Rebel T2i reveals that the top 4 reasons for their success are image quality, lens selection, size and cost. Canon targeted all of these areas very early on in the development of the EOS HD system.

2. Image Quality

More than anything else, the image quality of EOS Digital SLRs has drawn the attention of HD videographers worldwide. EOS HD SLRs have scored major points with the pros for high sensitivity and extremely low noise, and their relatively huge image sensors make it much easier to create a professionally cinematic look with shallow depth of field. However, image sensors alone do not explain the exceptional image quality of EOS HD video. It also comes from Canon's expertise in optics and natural color reproduction as well as its ability to develop image processors such as DIGIC 4 which possess the speed and power not only to generate a 1080p Full HD video signal, but also to encode that signal in a way that preserves excellent quality at a relatively high level of data compression. Ultimately, the image quality of current EOS SLRs produces a 'look' that is both unique and desirable in the world of HD video.

Here are some sample videos shot with HD-compatible EOS Digital SLRs:

- **Nocturne**, shot with EOS-1D Mark IV by Vincent Laforet:
<http://www.usa.canon.com/dlc/controller?act=GetArticleAct&articleID=3228>
- **Reverie**, shot with EOS 5D Mark II by Vincent Laforet:
<http://www.usa.canon.com/dlc/controller?act=GetArticleAct&articleID=2326>
- **JC plus Esther**, shot with EOS 7D by Patrick Moreau/Stillmotion:
<http://vimeo.com/6496808>

3. Lens Selection

Another important reason behind the popularity of the EOS System for HD video is its access to a seemingly unlimited selection of interchangeable lenses. We will cover the topic of lenses in more detail later in this document, but the essential point to be gained here is that videographers using the EOS System can choose the best lens for the job or the budget or both. Canon currently offers more than 60 interchangeable lenses for EOS cameras, and new models are introduced every year. With mount adapters, EOS HD SLRs can also be used with a wide variety of independently manufactured lenses for even greater creative flexibility.



Canon offers more than 60 EF and EF-S lenses for HD-compatible EOS Digital SLRs.

4. Size

Many HD videographers have told Canon that they prefer to use EOS HD SLRs for assignments that involve shooting in tight spaces. Even the biggest EOS cameras are much smaller than most professional video cameras, so it is easier to use them in situations where there simply isn't enough room to position a larger rig. The high sensitivity and low noise of EOS HD SLRs also help to minimize their 'footprint,' because they reduce the need for bulky supplementary lighting equipment.



XF305 HD Camcorder



EOS 7D

HD-compatible EOS Digital SLRs are smaller than many professional HD camcorders.

5. Cost

Last but not least, EOS HD SLRs are popular because they tend to be far more affordable than conventional professional video cameras. This was true with the EOS 5D Mark II, which came to market in the USA for well under \$3,000. But it is even more compelling with newer models such as the EOS 7D, which can currently be purchased for under \$1,700 and the EOS Rebel T3i, which is currently available for less than \$800 in a body-only configuration.ⁱ

Gale Tattersall, Director of Photography for Fox Television's award-winning drama series "House M.D." says this: "Most importantly, I think cameras like [the EOS 5D Mark II] really have created a great democratization. A lot of talented people have no excuse but to go out and make their dream movie. I think these cameras are as game changing as anything we've seen in this business in the last 30 years."

II. HD-Compatible EOS Digital SLRs

1. Feature Comparison

As of September, 2010 Canon offers six EOS Digital SLRs with HD Video capability: the EOS-1D Mark IV, EOS 5D Mark II, EOS 7D, EOS 60D, EOS Rebel T2i and EOS Rebel T1i. Here's how they compare in terms of video specifications:

Feature	EOS-1D Mark IV	EOS 5D Mark II	EOS 7D	EOS Rebel T3i, T2i, EOS 60D	EOS Rebel T3
CMOS Sensor Dimensions	18.6 x 27.9mm	24 x 36mm	14.9 x 22.3mm	14.9 x 22.3mm	14.7 x 22.0mm
Still Photo Resolution	16.1 Megapixels	21.1 Megapixels	18.0 Megapixels	18.0 Megapixels	12.2 Megapixels
Video Resolution & Framing Rates	1920 x 1080 @24, 25, 30 fps 1280 x 720 @ 50, 60 fps 640 x 480 @ 50, 60 fps	1920 x 1080 @24, 25, 30 fps* 640 x 480 @ 25, 30 fps* *with firmware update	1920 x 1080 @24, 25, 30 fps 1280 x 720 @ 50, 60 fps 640 x 480 @ 50, 60 fps	1920 x 1080 @24, 25, 30 fps 1280 x 720 @ 50, 60 fps 640 x 480 @ 50, 60 fps	1280 x 720 @ 25, 30 fps
Exposure Control	Auto + Manual	Auto + Manual* *with firmware update	Auto + Manual	Auto + Manual	Auto Only
Audio Features	Built-in Speaker, Mic External Stereo Mic	Built-in Speaker, Mic External Stereo Mic	Built-in Speaker, Mic External Stereo Mic	Built-in Speaker, Mic External Stereo Mic	Built-in Speaker, Mic
ISO Range Still (Video)	50 - 102,400 (100 - 102,400)	50 - 25,600 (100 - 12,800)	100 - 12,800 (100 - 12,800)	100 - 12,800 (100 - 12,800)	100 - 6400 (100 - 6400)
Recording Media	CF Card (1 slot), SD/SDHC Card (1 slot) External USB HD via WFT-E2 II A	CF Card (1 slot) External USB HD via WFT-E4 II A	CF Card (1 slot) External USB HD via WFT-E5A	SD/SDHC/SDXC Card (1 slot)	SD/SDHC/SDXC Card (1 slot)

Each HD-compatible EOS Digital SLR has its own unique combination of features for both still and video capture. Concentrating on video aspects, the EOS-1D Mark IV stands out for its class-leading low light sensitivity up to ISO 102,400 as well as its dual memory card slot design and its 720p/60 fps slow motion capture capability. The EOS 5D Mark II is unique in this group because of its full-frame CMOS sensor and manual overrides for audio levels as well as exposure control. The EOS 7D offers tremendous value for its price, with a full set of features for video resolution and framing rates, plus manual exposure control, HDMI output and external audio input. The EOS Rebel T3i, T2i and 60D are even more affordable than the 7D, with a near-identical set of video and audio features. The EOS Rebel T3 redefines entry-level HD video capture with a basic yet adequate feature set at a minimal price. The bottom line is this: Canon offers the widest range of Full HD-compatible digital SLRs on the market, with models available at all popular price points. Whatever your needs might be in terms of cost or performance, chances are good there's an EOS Digital SLR that will meet them.



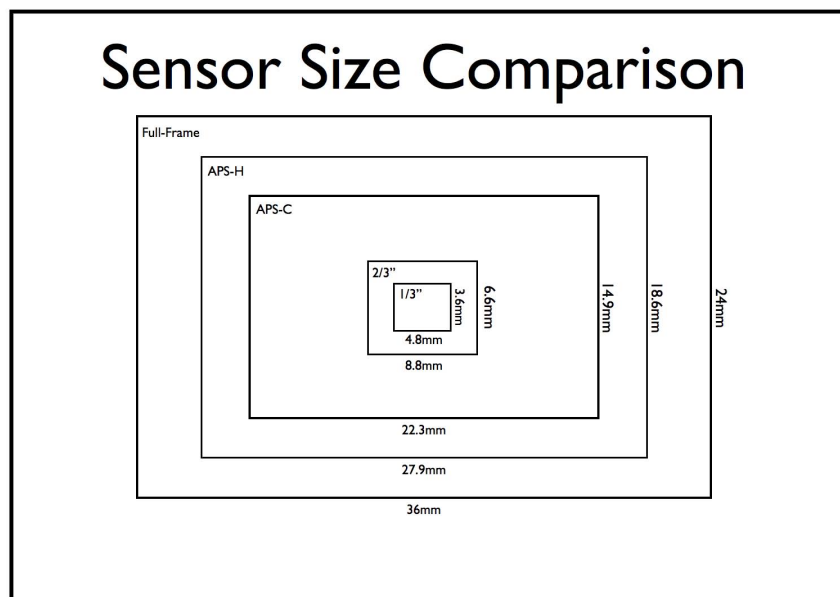
Canon offers more HD-compatible Digital SLRs than any other manufacturer.

2. Sensor Size Comparison

If you are learning about SLR-based HD video for the first time, you might well ask why sensor size should make any difference when it comes to choosing an HD video capture device. After all, there are plenty of consumer-grade HD camcorders on the market today that achieve Full HD resolution with sensors as small as 3.6 x 4.8mm, also known as 1/3" size. Costly professional HD cameras used by broadcast TV networks often use 2/3" image sensors with an active surface area of approximately 6.6 x 8.8mm.

However, as you can see from the Feature Comparison chart above, even the lowest priced HD-compatible EOS Digital SLR has much larger sensor dimensions than that. Canon currently offers three sensor sizes for HD-compatible EOS Digital SLRs. The smallest one is 14.9 x 22.3mm¹, which is also known as APS-C. This size is used by the EOS 7D, 60D and the Rebel series. The EOS-1D Mark IV clocks in at 18.6 x 27.9mm, which is known as APS-H, and the EOS 5D Mark II has the largest sensor size at 24 x 36mm, which is the same size as a full frame of 35mm film.

¹ The sensor dimensions of the new EOS Rebel T3 are 14.7 x 22.0mm, which is also considered APS-C.



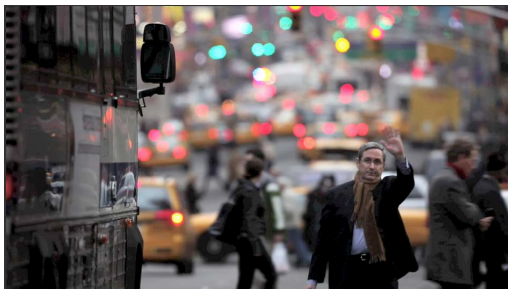
HD-compatible EOS Digital SLRs feature large image sensors that deliver high sensitivity and low noise while making it easier to achieve shallow depth of field.

If all of these sensors can be used to produce Full HD video, why is bigger better? The main reasons are superior low light sensitivity, significantly lower noise, expanded dynamic range and the ability to create shallower depth of field when subject distance and angle of view are equalized. The improvements in low light sensitivity, noise levels and dynamic range occur because individual photodiodes, sometimes called pixels, tend to be larger on large sensors. The larger the photodiode size, the better capacity it has for capturing light.

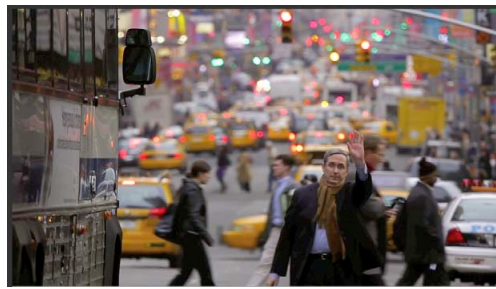
3. Depth of Field Comparison

Shallow depth of field is a very useful and desirable creative tool because it allows the photographer or videographer to draw the viewer's attention to the subject by isolating it against an out-of-focus background. Larger sensors make shallow depth of field easier to achieve than smaller sensors by virtue of the fact that longer focal length lenses must be used to achieve the same angle of view when subject distance is equal.

These sample images show the difference that sensor size can make in terms of depth of field. Subject distance, angle of view and aperture value are the same, but the image on the left was shot with a 500mm lens on an EOS 5D Mark II, which features a full-frame 24 x 36mm image sensor. The image on the right was shot with a 300mm lens on an EOS Rebel T1i, which features a 14.9 x 22.3mm image sensor. The larger sensor size of the 5D Mark II allowed the use of a longer focal length lens without changing the angle of view or the subject distance, resulting in shallower depth of field.



Shot with EOS 5D Mark II and EF 500mm f/4L IS USM lens



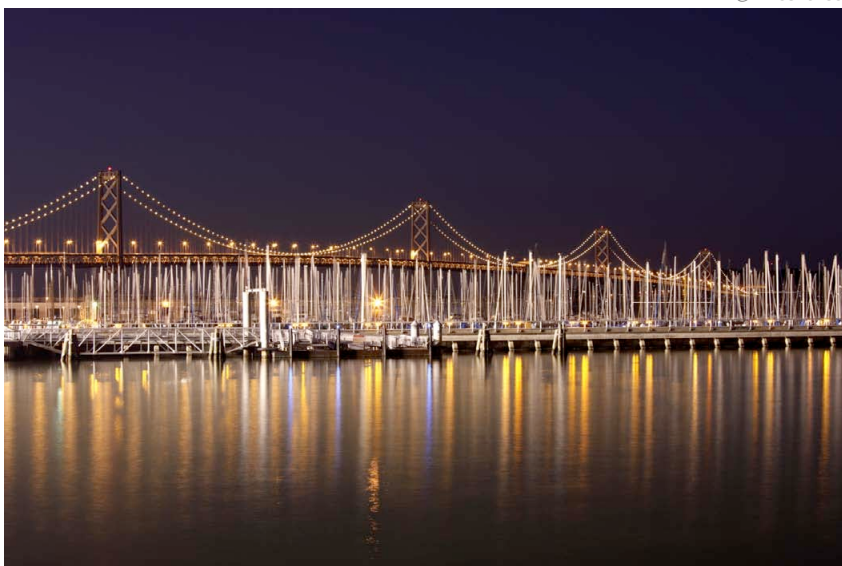
Shot with EOS Rebel T1i and EF 300mm f/2.8L IS USM lens (Photos courtesy of Rob Galbraith & Vincent Laforet)

HD video and still image capture are vastly different from each other in many aspects of creative expression, but one characteristic they share in common is the importance of lens selection. At any given sensor size, the lens you choose helps you to control the look of your images in various ways including compression or expansion of apparent perspective as well as depth of field. The EOS System's compatibility with an immense range of interchangeable lenses gives photographers and videographers exceptional creative flexibility. Let's take a closer look at some of the most popular lens categories:

Large Aperture Lenses

Large aperture lenses provide two major benefits to photographers and videographers: one is the ability to produce shallower depth of field than lenses of the same focal length with smaller apertures, and another is the ability to shoot in lower light, and/or with lower ISO speed settings for better image quality. Canon's EF Lens line-up has one of the best selections of large-aperture prime lenses available anywhere, covering a wide range of focal lengths from 24mm to 200mm as follows:

©Vincent Isola



Canon Explorer of Light Vincent Isola used an EF 50mm f/1.2L USM lens to create this spectacular shot.

- EF 24mm f/1.4L II USM
- EF 35mm f/1.4L USM
- EF 50mm f/1.2L USM
- EF 85mm f/1.2L II USM
- EF 85mm f/1.8 USM
- EF 100mm f/2 USM
- EF 135mm f/2L USM
- EF 200mm f/2L IS USM

All of these large-aperture lenses are equipped with Canon's original Ring USM for autofocus with full-time mechanical manual focus. The mechanical manual focus comes in handy for HD video applications, especially with custom rigs. However, a little-known feature of the ultrasonic motor is its ability to be operated through a compatible personal computer running the Remote Live View program that's part of Canon's EOS Utility software application. This feature allows the lens to be focused remotely by clicking on the appropriate screen controls. For more details on Remote Live View, please read the EOS Creative Essentials Class Notes.

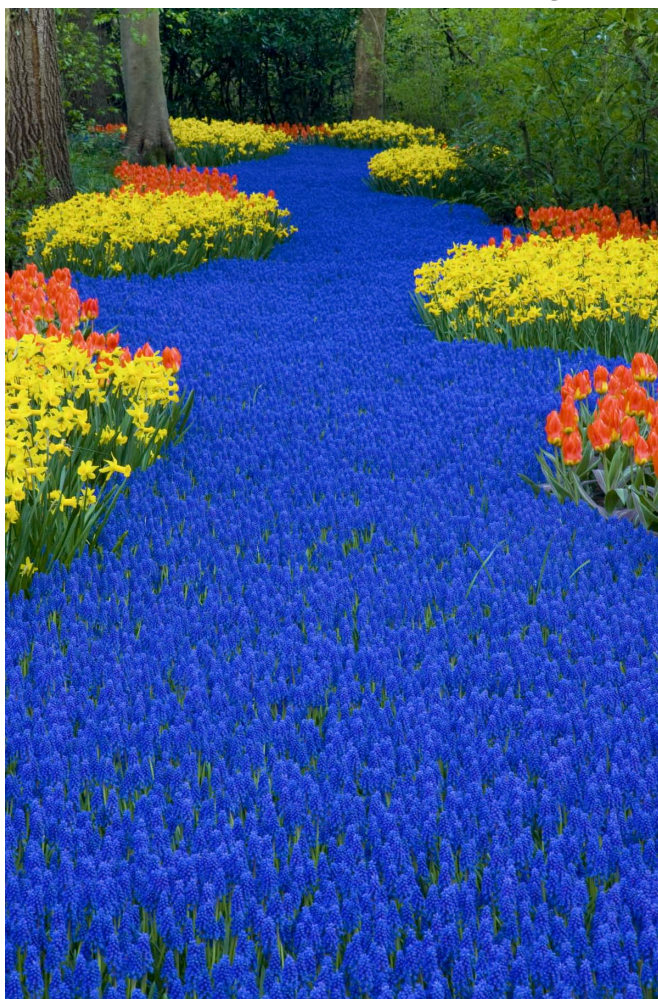
Tilt-Shift Lenses

Canon was the world's first manufacturer to produce tilt-shift lenses for 35mm SLRs, beginning with the TS35mm f/2.8 SSC back in 1973. Fast forward to 2010, and the EOS System currently offers 4 TS-E lenses with focal lengths ranging from 17mm to 90mm:

- TS-E 17mm f/4L
- TS-E 24mm f/3.5L II
- TS-E 45mm f/2.8
- TS-E 90mm f/2.8

Tilt-shift lenses are normally used for architectural, landscape and product photography, where their abilities to correct perspective distortion and expand the apparent depth of field in an image are particularly useful and appreciated. Recently, though, it has become quite trendy to drastically reduce depth of field by reversing the angle of tilt. This is sometimes called the "miniature" effect because of the way it makes real objects look like they are part of a diorama.

©Darrell Gulin



Canon Explorer of Light Darrell Gulin used the tilt function of the TS-E 90mm f/2.8 to create this image.

Although tilt-shift lenses have long been popular for still photography, they have not been readily available for Full HD video until the EOS System came along. Now videographers everywhere are taking advantage of Canon's TS-E lenses to create stunning visual effects.

Macro Lenses

The miniature world presents an inexhaustible supply of subjects for close-up photography. Flowers, leaves, insects, spiders, mechanisms, small parts, micro-electronics, stamps, coins – the list could go on for pages. Wherever you are located, there is always a close-up subject at hand to inspire a photograph. And if the subject happens to be moving, then video capture becomes a compelling way to tell the story visually.

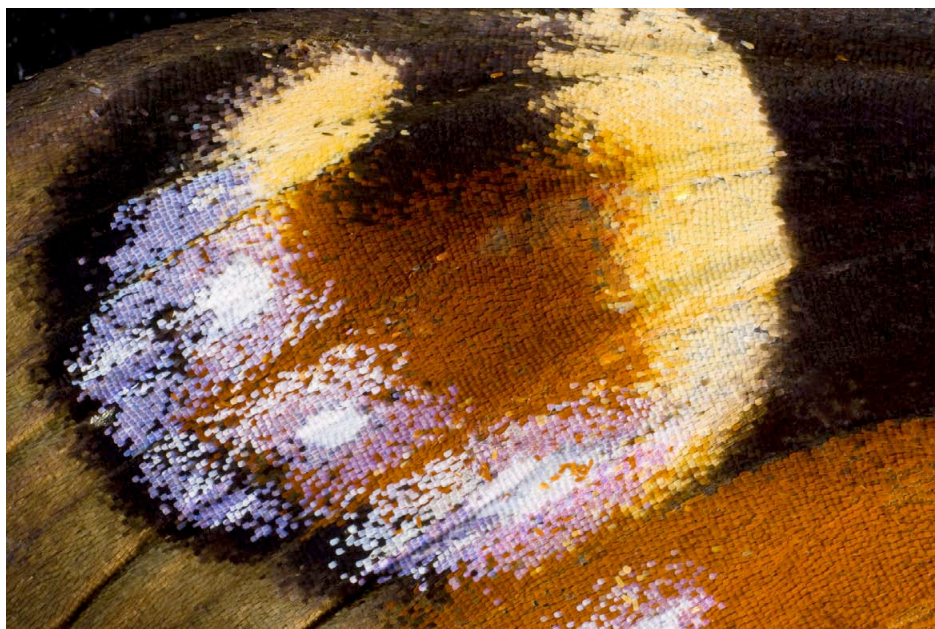
Canon offers an extensive range of true macro lenses for the EOS System, so you can choose the best lens for your needs. Here is a list of them with their key specifications:

Lens	Magnification Range (Unassisted)	Working Distance @ 1x	Compatibility
EF 50mm f/2.5 Compact Macro & Life-Size Converter EF	Infinity - 0.5x/ 0.25x - 1x (w/Life Size Converter)	2.75 inches	All EOS Cameras
EF-S 60mm f/2.8 Macro USM	Infinity - 1x	3.5 inches	Rebel series DSLRs, 7D, 20D, 30D, 40D, 50D, 60D
MP-E 65mm f/2.8 1 - 5x Macro Photo	1x - 5x	4.0 inches	All EOS Cameras
EF 100mm f/2.8L Macro IS USM	Infinity - 1x	5.5 inches	All EOS Cameras
EF 100mm f/2.8 Macro USM	Infinity - 1x	5.9 inches	All EOS Cameras
EF 180mm f/3.5L Macro USM	Infinity - 1x	9.8 inches	All EOS Cameras

One of the most important differences between these lenses is their working distance, which is measured from the front of the lens to the subject. Greater working distance is very desirable when photographing live subjects like insects or small animals, which might be disturbed if you get too close.

All Canon Macro lenses can achieve life-size magnification (1x), but that's just the starting point for the MP-E 65mm f/2.8 Macro Photo lens. The MP-E lens is unique within the Canon line for its ability to achieve magnifications anywhere from 1x to 5x simply by adjusting focus. This lens actually lets you see details in your subject that are too small to resolve with the naked eye.

© Darrell Gulin



Detail of butterfly wing photographed with MP-E 65mm f/2.8 1-5X Macro Photo lens

Another characteristic of macro lenses is their incredibly shallow depth of field at close range. This can create beautiful images when photographing flowers with their endless varieties of size, shape and color.

© Darrell Gulin



Canon Explorer of Light Darrell Gulin used the EF 180mm f/3.5L Macro USM to create this shot.

Ultra-Wide Angle & Fisheye Lenses

Ultra-wide angle and fisheye lenses help to create a powerful, expanded perspective that emphasizes your main subject while at the same time showing other scene elements clearly enough to be readable. Commonly used for landscape photography, ultra-wides are also popular for certain kinds of architectural work. In the world of video, though, ultra-wides are often used for ENG (Electronic News Gathering), due to their ability to provide an unobstructed full view of the subject when used at close range. This is often a requirement in video journalism, since the videographer typically must compete with photographers and other journalists to photograph a reporter, politician, or celebrity. Here again, the EOS System comes to the rescue with a broad range of ultra-wide angle lenses to choose from, including:

- EF 8-15mm f/4L Fisheye USM²
- EF-S 10-22mm f/3.5-4.5 USM³
- EF 14mm f/2.8L II USM
- EF 15mm f/2.8 Fisheye
- EF 16-35mm f/2.8L USM
- EF 17-40mm f/4L USM

© Vincent Isola



Canon Explorer of Light Vincent Isola used the EF 16-35mm f/2.8L USM lens for this shot.

² Scheduled for shipment in March, 2011.

³ (For 7D, 60D, T3i, T3, T2i and T1i among HD-compatible EOS Digital SLRs. Canon EF-S lenses are exclusively for use with compatible EOS cameras with APS-C sensors, and cannot be mounted onto EOS-1D/1Ds series or 5D series cameras.)

Super-Telephoto Lenses

At the other end of the scale in more ways than one is Canon's unparalleled range of super-telephoto EF lenses. These are some of the sharpest lenses money can buy, and to make using them even easier, all are equipped with powerful optical image stabilizers.

- EF 200mm f/2L IS USM
- EF 300mm f/2.8L IS USM, EF 300mm f/2.8L IS II USM (scheduled for March 2011)
- EF 400mm f/2.8L IS USM, EF 400mm f/2.8L IS II USM (scheduled for March 2011)
- EF 400mm f/4 DO IS USM
- EF 500mm f/4L IS USM, EF 500mm f/4L IS II USM (scheduled for 2011)
- EF 600mm f/4L IS USM, EF 600mm f/4L IS II USM (scheduled for 2011)
- EF 800mm f/5.6L IS USM

Ideal for many HD video assignments including sports and nature, these lenses can be used in a wide variety of lighting conditions due to their large apertures. They are also excellent choices for isolating subjects against a busy background when shooting at relatively close range due to their ability to achieve shallow depth of field. Last but not least, all of these lenses are weather-resistant, with gaskets and seals in all critical areas including operational switches and focusing rings

© Bruce Dorn



Canon Explorer of Light Bruce Dorn used the EF 400mm f/4 DO IS USM lens for this shot.

III. EOS HD Camera Set-Up Basics & Options

1. Introduction

For best results when capturing HD video with EOS Digital SLRs, it is important to master the basics of setting up the camera properly. Once that level of knowledge has been achieved, you will be in a better position to understand the optional settings that are available. In this section of EOS HD Video Basics, we will explore basic camera settings as well as the most useful options so that you can make the most of your Canon equipment for video capture.

2. Enabling Live View for Video Capture

Live View is the use of the LCD monitor as your viewfinder, to compose your subjects before and during shooting. The use of Live View is a prerequisite for capturing video with HD-compatible EOS Digital SLRs. The details for enabling Live View vary slightly from model to model, so let's cover them one by one.

EOS-1D Mark IV

- Go to Setup Menu 2 and locate 'Live View/Movie func. Set' at the bottom of the screen, then press SET.
- From the 'Live View/Movie func. Set' submenu, change the setting for 'LV Camera/Movie set.' from 'Disable' to 'Movies.'
- Press the shutter button halfway to extinguish the menu screen, then press the SET button to activate Live View.

EOS 5D Mark II

- Go to Setup Menu 2 and locate 'Live View/Movie func. Set' at the bottom of the screen, then press SET.
- From the 'Live View/Movie func. set' submenu, locate 'LV func. Setting' at the top of the screen and press SET.
- From the 'Live View function settings' submenu, change the 'LV func. setting' from 'Disable' to "Stills + movie" and press SET.
- From the 'Screen settings' submenu, select 'Movie display' and press SET.
- Press the shutter button halfway to extinguish the menu screen, then press the dedicated Live View button to activate Live View.

EOS 7D

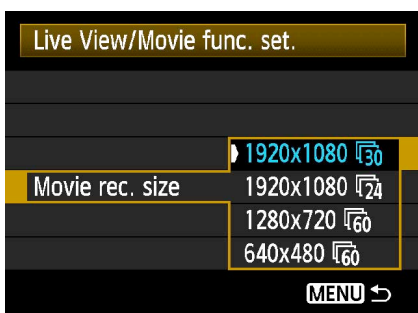
- Turn the Live View/Movie Shooting Switch to the left towards the red movie camera icon to activate the Movie Shooting display.

EOS 60D, EOS Rebel T3i, T3, T2i & T1i

- Turn the mode dial on top of the camera to Movie mode to activate the Movie Shooting display.

3. Selecting Resolution & Frame Rates

Once Live View is activated, the settings for video resolution and frame rates become a top priority. Your selection of these settings should be carefully considered, based on your assignment or application.



Select the desired video resolution and frame rate from the camera's LCD menu.

Video Resolution: How many pixels are in each frame?

- **Full HD 1080p (1920 x 1080):** Use this setting for maximum image quality, but be aware that it will result in large file sizes on the memory card. Full HD resolution is available on all HD-compatible EOS Digital SLRs. Each frame contains approx. 2.07 million pixels.
- **HD 720p (1280 x 720):** This lower resolution setting is available on all current HD-compatible EOS models except the 5D Mark II. It is ideal for HD video projects that will end up on the World Wide Web, where lower resolution can be a virtue due to bandwidth considerations. HD 720p is also the maximum resolution currently available for 50 fps and 60 fps slow motion video capture with the EOS-1D Mark IV, 7D, 60D and Rebel T2i models. Each frame contains approx. 921,000 pixels.
- **SD 480p (640 x 480):** Standard definition video is the optimum setting for projects where smaller file sizes or longer individual clip lengths are more important than high definition. SD can also result in a quicker workflow when producing conventional DVDs. Each frame contains approx. 307,000 pixels.

Frame Rates: How many frames per second are captured?

- **24P:** This is the most popular Full HD frame rate for video cinematography, since it matches the standard frame rate for conventional film-based movies. The actual frame rate of 24P with EOS Digital SLRs is 23.976 frames per second, in order to meet broadcast TV standards.⁴

⁴ Incidentally the 'P' in 24P and other video frame rates listed here stands for Progressive Scan, in which individual video images are recorded as full frames. The alternative would be "i," which stands for 'interlaced.' EOS HD SLRs record in progressive mode exclusively.

- **25P:** This is the standard Full HD frame rate for video projects intended for use in Europe and other areas where the PAL system is used. The actual frame rate of 25P is 25.00 frames per second.
- **30P:** This is the standard Full HD frame rate for broadcast video projects in North America and other areas where the NTSC system is dominant. The actual frame rate of 30P with all current EOS HD-compatible digital SLRs is 29.97 fps to meet network television standards. Note that subject motion appears slightly smoother at 30P versus 24P.
- **50P:** With HD-compatible EOS Digital SLRs such as the EOS-1D Mark IV, EOS 7D, EOS 60D, EOS Rebel T3i and EOS Rebel T2i, 50P is used with 720p HD video recording for slow motion video projects intended for use in Europe and other areas where the PAL system is used. The actual frame rate of 50P is 50.00 frames per second.
- **60P:** 60P is used with 720p HD video recording for slow motion video projects intended for use in North America and other areas where the NTSC system is dominant. The actual frame rate of 60P with the EOS-1D Mark IV, EOS 7D, EOS 60D, EOS Rebel T3i and EOS Rebel T2i is 59.94 fps to meet network television standards. 50P and 60P are popular for sports action.⁵

4. What are Picture Styles and Why Are They Important for Video?

Canon developed the Picture Style concept in 2005 with the introduction of the EOS-1D Mark II N and the original EOS 5D. At that time, the main purpose of Picture Styles was to give photographers easier control over the look of their still photographs, in terms of image processing parameters such as sharpening, contrast, saturation and color tone. In the case of RAW still images, Picture Styles are optional settings that do not affect the actual image data. They can be ignored or overridden during post-processing, according to the personal preferences of the photographer. However, for in-camera JPEGs, Picture Style settings are effectively “baked in” to the file in much the same way as other camera settings such as white balance, color space, etc.

Video capture with HD-compatible EOS Digital SLRs is essentially equivalent to shooting in-camera JPEGs at the frame rate of choice, ranging from 24P to 60P. Therefore, the Picture Style settings you select will have a direct effect on the look of the videos you produce.

⁵ Note that 50P and 60P settings are available exclusively for 720p HD recording with the EOS-1D Mark IV, EOS 7D, EOS 60D, EOS Rebel T3i and EOS Rebel T2i. These settings are not available for Full HD 1080p video recording with any current HD-compatible EOS Digital SLR.

There are 6 basic Picture Styles:
Standard, Portrait, Landscape, Neutral,
Faithful and Monochrome. Each of
these can be adjusted in-camera, using
slider-like menu settings. Each
compatible EOS camera also provides 3
User-Defined Picture Style settings;
these can be set directly in the camera
or uploaded from either Canon's web
site or Canon's Picture Style Editor
software.

Picture Style		⦿, ⦿, ⦿, ⦿
S Standard	3, 0, 0, 0	
P Portrait	2, 0, 0, 0	
L Landscape	4, 0, 0, 0	
N Neutral	0, 0, 0, 0	
F Faithful	0, 0, 0, 0	
M Monochrome	3, 0, N, N	
INFO. Detail set.		SET OK

Picture Style Menu

Selecting a Picture Style has roughly the same effect that choosing a different kind of film stock had in the 35mm era. For instance, changing from Standard to Landscape Picture Style will result in higher levels of sharpening overall, as well as increased saturation of greens and blues to enhance the appearance of typical landscape elements such as foliage, sky, and water. Changing from Standard to Neutral will reduce overall sharpening, contrast and saturation, which can be beneficial for post-processing in image editing software like DPP or Adobe Photoshop.



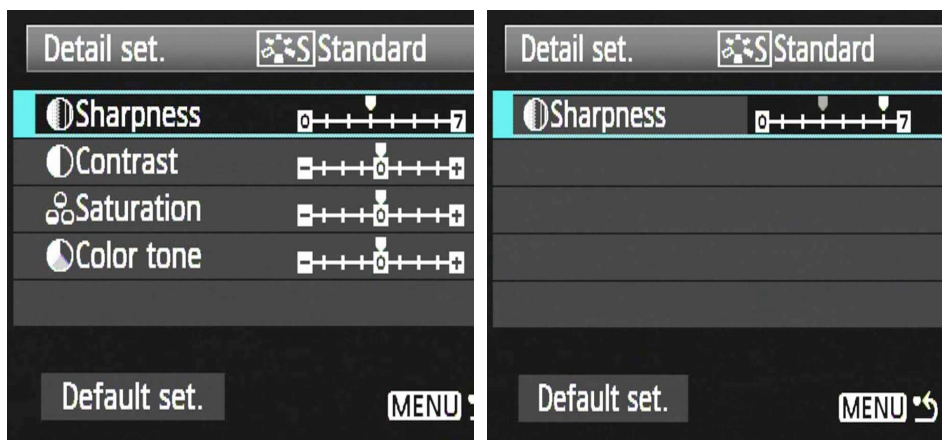
Picture Style settings control the overall appearance of EOS HD Video clips. Photo by Canon Explorer of Light Bruce Dorn.

Best Picture Styles for HD Video

Because Picture Style settings for video clips captured with EOS Digital SLRs cannot be completely overridden during post-processing, there are basically two schools of thought on how they should be used:

- EOS HD users interested in achieving the quickest and most convenient workflow for video projects will tend to use a Picture Style that most closely matches the look they wish to deliver to their client.
- EOS HD users who know in advance that they plan to “grade” or change the look of their videos during post-processing will tend to disable or reduce settings such as sharpness, contrast and saturation to provide maximum flexibility for editing. The Neutral or Faithful Picture Style settings are ideal starting points for this purpose.

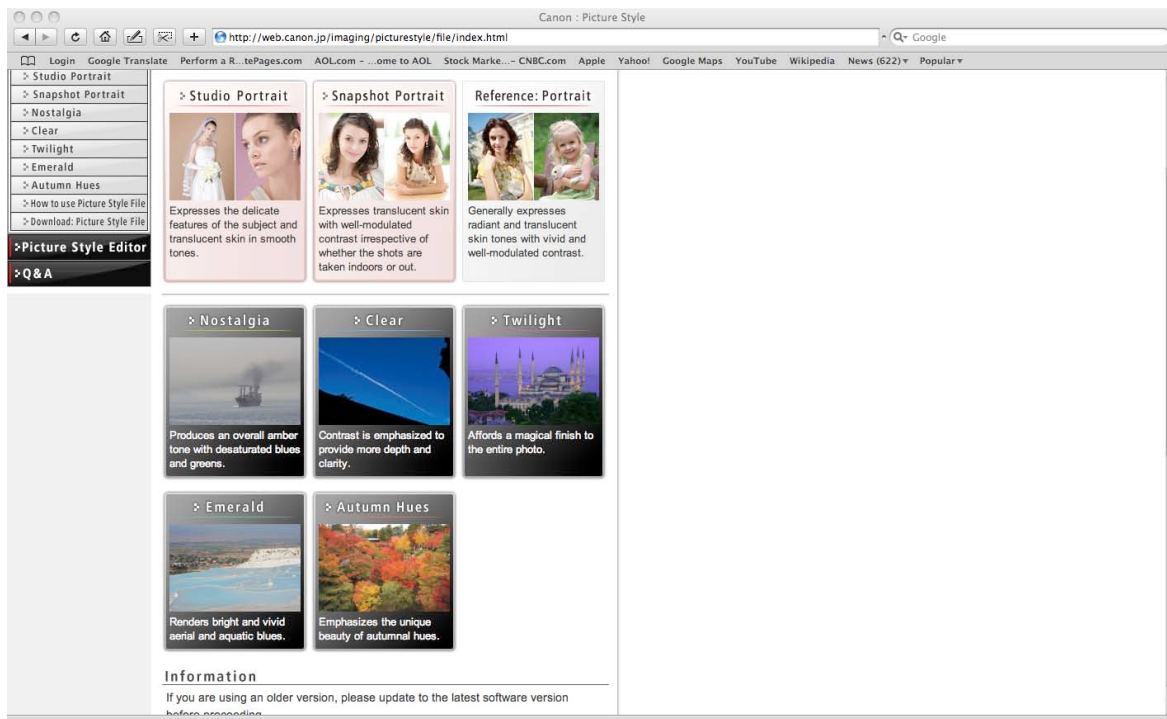
Canon’s Standard Picture Style is a good starting point for EOS HD Video users interested in a quick workflow. It applies moderate sharpening, contrast, and saturation enhancements to the image for a ‘vivid and crisp’ look. Another option for quick workflow is to use one of the other preset Picture Styles such as Portrait, Landscape or even Monochrome if you have a particular visual effect in mind. Each Picture Style can be further fine-tuned for contrast, color saturation, color tone and sharpening by the photographer, using the Detail Settings.



Sharpness, contrast, saturation and color tone can be adjusted individually with the Picture Style Detail Settings menu.

If the camera’s built-in Picture Style settings don’t quite match the visual effect you’re trying to achieve, but you’re still interested in a quick workflow, you may want to consider trying one or more of the downloadable Custom Picture Styles that Canon offers on its web site, including Studio Portrait, Snapshot Portrait, Clear, Nostalgia, Emerald, Twilight, and Autumn Hues. These files can be uploaded to your camera via EOS Utility software. Here is a link to the web page for Canon’s downloadable Picture Styles:

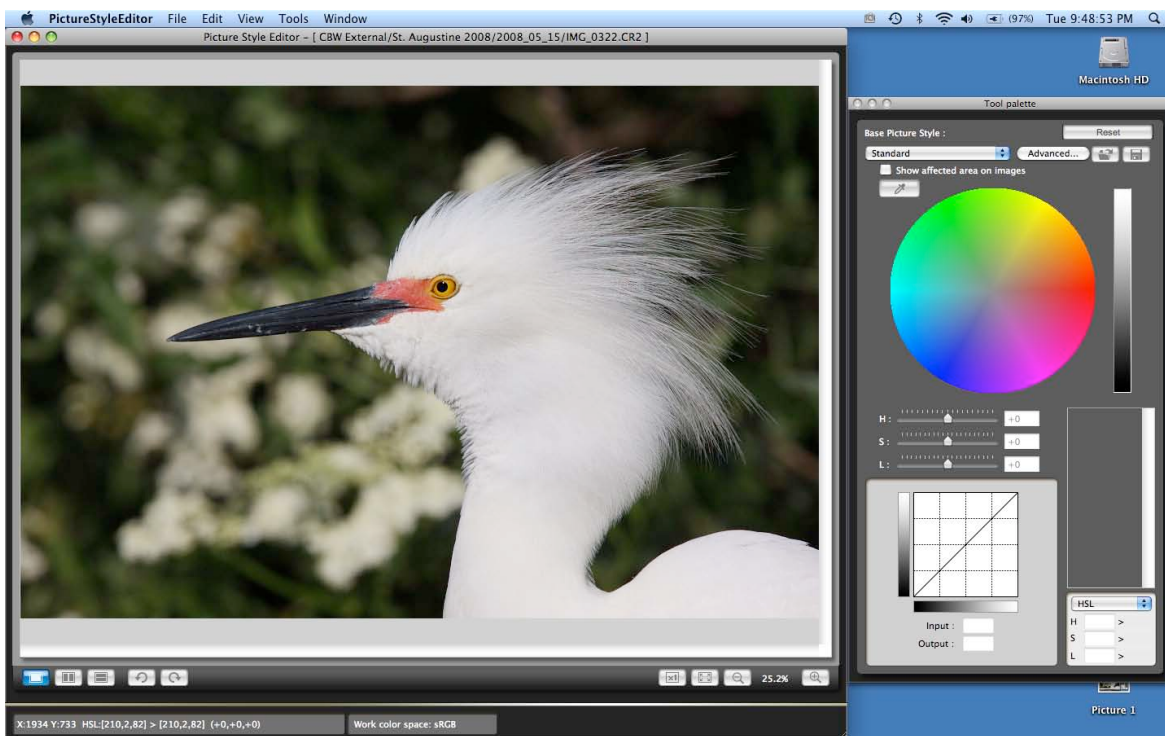
<http://web.canon.jp/imaging/picturestyle/index.html>



Custom Picture Style files are available for download at Canon's web site. You can also learn more about Picture Style Editor software by clicking the link on the left side of this web page.

The Standard Picture Style may well be too 'vivid' or 'crisp' for your taste, and in some cases you may find that its added contrast means that shadows are a bit dark. Also, you may find that sharpening, like permanent ink, is easily applied but almost impossible to remove after the fact. For these reasons, Canon's Neutral Picture Style may be a better starting point if you plan to grade your video during post-processing. Some EOS users go even further than the default settings for Neutral by dialing down contrast and saturation settings in the Detail Settings menu. (Sharpness is already disabled by default in Neutral.) This makes the video look "flat" at first, but it makes editing easier because more original image data is preserved.

Some EOS HD users may find that even the Neutral Picture Style doesn't provide as much control as they want. For these individuals, Canon provides Picture Style Editor software, also called PSE for short. In addition to providing adjustments for sharpness, contrast, saturation and color tone, PSE allows precise adjustments of other image attributes such as tone curves. The tone curve adjustment lets you control the appearance of midtones, shadows and highlights to help you create a custom 'look' for EOS HD Video that can't be achieved in any other way. For more information on PSE including an online tutorial, please visit the web link listed above.

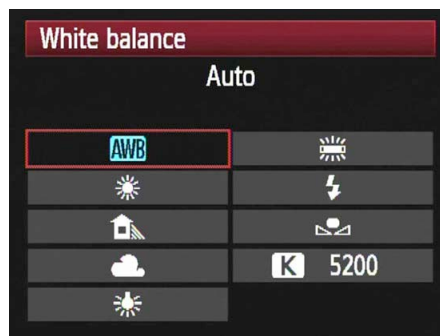
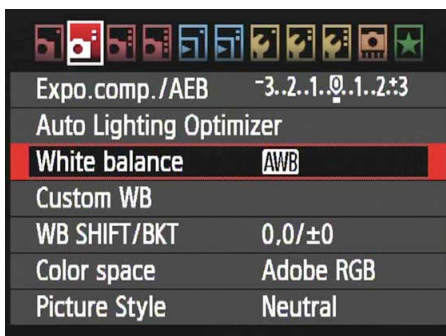


Picture Style Editor software allows precise adjustments of tone curves and other image quality attributes. Photo by Chuck Westfall/Canon USA

There is no single “right answer” when it comes to Picture Style settings, because the choice is very much a matter of personal preference. While you’re learning about your EOS camera, we urge you to experiment with Picture Styles until you find the settings that work best for you.

5. Setting White Balance

White Balance is the most critical setting on your EOS camera when it comes to controlling overall color accuracy. This setting works hand-in-hand with Picture Style and exposure control to determine how your videos will look coming straight out of the camera.



There are several ways to select a White Balance setting with EOS cameras. One method that works with all models is to use the camera's LCD menu. Go to the Recording menu, select White Balance and press SET, then select the desired WB setting and press SET again.

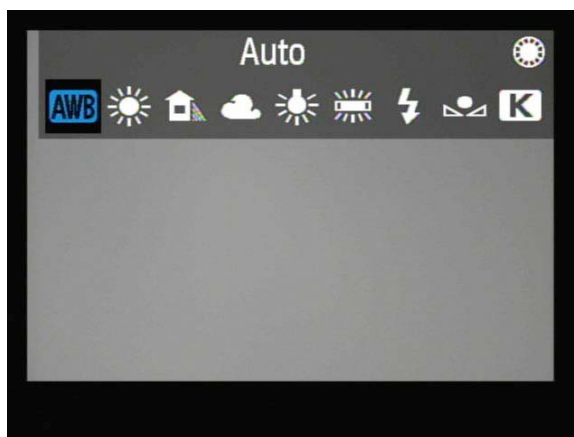
The goal of the White Balance (WB) setting is to ensure that whites, grays and blacks in your images appear neutral, without any color tint. This is something we take for granted with normal human vision, because our brains automatically adapt to variations in overall color balance from different light sources. But the situation is not quite the same with digital cameras. Here are the main options for WB in the EOS System:

Auto (AWB)

This setting attempts to set a neutral white balance automatically, based on an analysis of image data from the CMOS sensor. The details of the camera's algorithm for determining auto white balance are complex, but briefly the camera makes an educated guess about which objects in the scene should be neutral. It then sets the white balance according to that information. AWB is a mixed blessing for video capture, because it can change the color balance from moment to moment depending on where the camera is aimed. For this reason, advanced videographers often tend to prefer a fixed WB setting to stabilize the color balance according to the look they are trying to achieve.

Preset WB

Your HD-compatible EOS Digital SLR is equipped with several preset WB settings, including Daylight, Shade, Cloudy, Tungsten, and Fluorescent. These settings are often quite effective because they cover the most common kinds of lighting conditions users are likely to encounter. With a preset White Balance setting, there is no tendency for color balance to shift as the camera is moved across a scene, unlike AWB. When AWB doesn't seem to be giving you the right answer for the lighting conditions you're in, a preset WB setting is often your best option.



White Balance settings can also be selected in Live View with most HD-compatible EOS Digital SLRs.

Manual WB (Color Temperature Settings)

HD-compatible EOS Digital SLRs above the Rebel series are equipped with a Manual WB feature that lets you dial in color temperature settings in degrees Kelvin, from 2500K to 10000K in 100K increments. This is the WB setting of choice for many professional videographers because it gives them a greater fine-tuning capability than the Preset options. Once you've set a specific color temperature setting, it stays locked in until you change it. Manual WB is particularly helpful when you want to "warm up" or "cool down" your white balance to enhance the mood you are trying to create. For instance, in typical 5500K mid-day daylight, setting the Manual WB to a low Kelvin value (like 3000K or 2500K) will produce a very cool, bluish cast, while setting a higher value (like 8000K) will create a much warmer, amber-toned result.

Custom WB (CWB)

Custom WB is a valuable feature that is particularly useful in mixed lighting conditions. The basic procedure for registering and setting a Custom White Balance with an EOS Digital SLR is as follows:

1. Photograph a neutral reference target such as a white sheet of paper or a gray card in the lighting conditions you plan to shoot. This can be done at any WB setting. Just make sure that your exposure is reasonably accurate. (Use the camera's histogram display to check it.) The more overexposed or underexposed your test image is, the less suitable it becomes for Custom White Balance. Also, the reference target does not have to fill the frame, but it should at least fully cover the partial or spot metering circle at the center of the focusing screen.
2. Locate Custom WB on the camera's LCD menu and press the SET button.
3. Display the reference image and select OK on the menu.
4. Set the camera to its Custom WB setting and shoot.



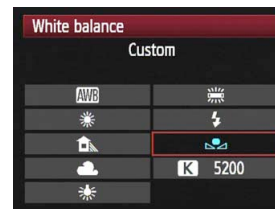
Photograph a neutral reference target.



Select Custom WB from the LCD menu.



Display the reference image and select OK.



Select Custom WB from the White Balance menu and press SET.

A custom white balance setting can differ from a manually set color temperature setting in two possible ways:

- It can be set to a lower color temperature than a manual setting: The range for CWB in an EOS digital SLR goes down to 2000K, whereas the manual settings go down to 2500K at best (2800K for older EOS models).
- It can be corrected in the amber/blue and/or magenta/green axes with the camera's WB Shift menu, while color temperature settings in Manual WB can only effectively make changes in the amber/blue direction.

The EOS-1D Mark IV can store up to five custom white balance settings that can be named directly in the camera. Other HD-compatible models like the 5D Mark II, 7D, 60D and Rebel T3i/T3/T2i/T1i can only store one.

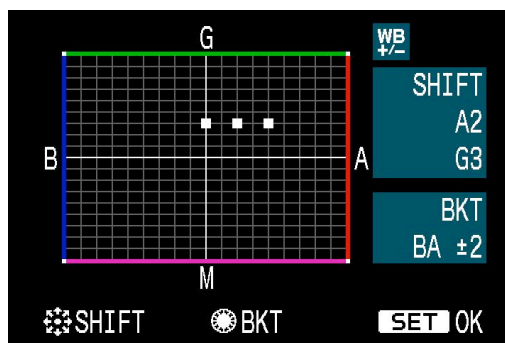
Personal WB

Personal WB is a feature that is exclusive to the EOS-1D Mark IV. It is an ideal solution if you will be shooting repeatedly in the same environment and lighting, especially when the lighting is mixed or difficult to balance properly. With this method, 1D Mark IV users can register and name up to 5 personal white balance files (.WBD files) by connecting the camera to a compatible personal computer via USB and running the Remote Live View or Test Shooting functions of EOS Utility software. To register a Personal WB setting, use the eyedropper in the upper right corner of the Remote Live View window to click on a neutral tone in the Remote Live View image, then click on Register to name and save the .WBD file to your computer's desktop or a user-designated folder. Once the personal white balance files have been registered, named and stored on the computer, they can be uploaded to the 1D Mark IV through EOS Utility. To access Personal WB settings on the 1D Mark IV, press the FUNC. Button on the back of the camera below the auxiliary LCD data panel a couple of times until you enter the WB setting mode, then use the quick control dial on the back of the camera to select the desired WB setting. Personal WB settings are listed on the LCD data panel as PC-1, PC-2, PC-3, PC-4 or PC-5. Clearly, Personal WB settings take more effort to create than any of the other available options, but they are likely to be the WB settings of choice for maximum precision during studio sessions where the 1D Mark IV can be connected to a calibrated and color-managed computer system.

WB Shift & WB Bracketing

These features are available on all HD-compatible EOS Digital SLRs. They allow users to tweak or fine-tune AWB, Preset or Manual WB settings up to +/- 9 steps in very fine increments. If you find that a particular WB setting is close but you want to "tweak" it just a little more, WB Shift allows this fine control for still or video shooting.

The WB Shift menu screen provides shift control along the Amber/Blue axis for color temperature adjustment. It also provides shift control along the Magenta/Green axis for color compensation adjustment. The two settings can be freely combined for maximum creative control. WB Bracketing is set up with the WB Shift menu screen; it produces 3 still captures with varying WB Shift settings from a single shutter click, so that you can evaluate which shift setting is best for the lighting conditions at hand.



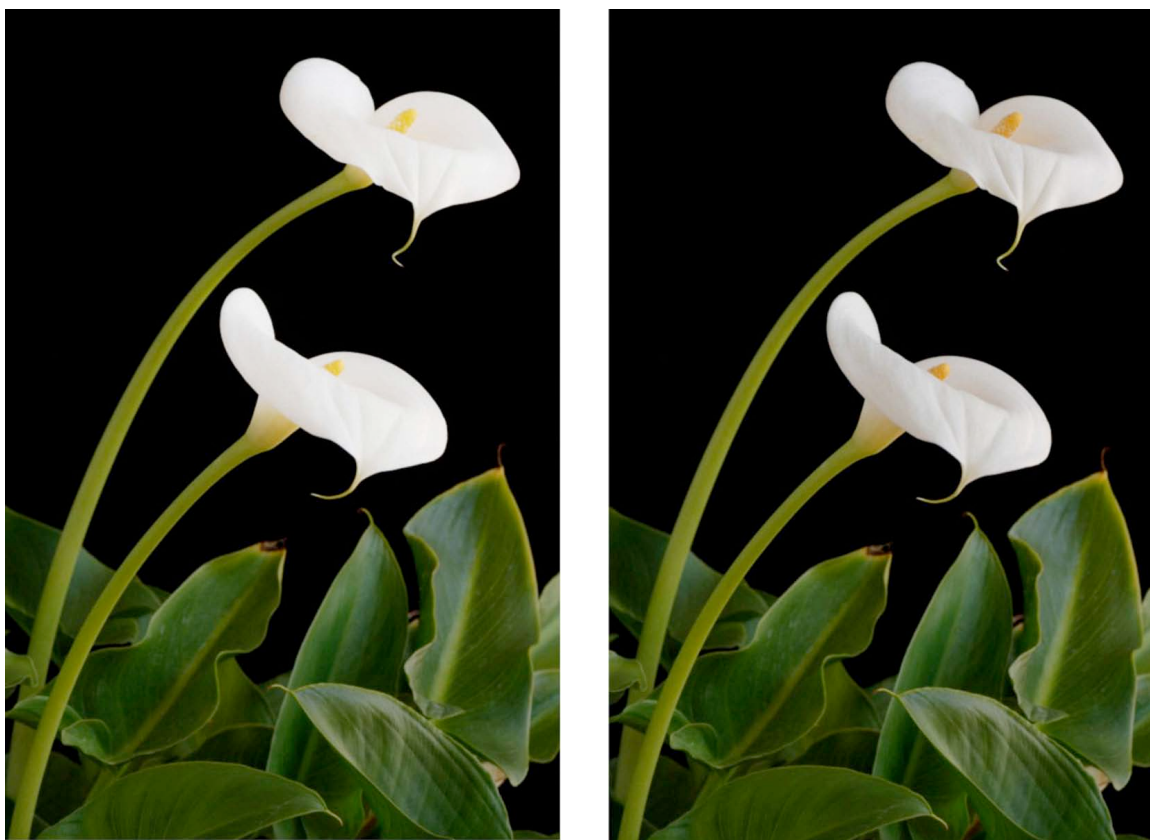
WB Shift and WB Bracketing are set from this menu screen, which can be accessed from the camera's Recording menu. See text for details.

6. Other Image Quality Modifiers

In addition to Picture Styles and White Balance settings, there are several other camera settings that have a direct effect on the look of videos created with HD-compatible EOS Digital SLRs. In this section, we'll take a look at three of the most important settings, including some that could make the difference between an average video and a great one.

Highlight Tone Priority

If your video project contains a lot of bright subject matter, such as white wedding dresses, bright flowers or sunsets with clouds, you may find that Highlight Tone Priority (HTP for short) can really improve the quality of your images. HTP has no effect on the actual dynamic range of the image sensor. It's just an alternative method of image processing that preserves more highlight detail than Canon's standard processing, without significantly altering midtones or shadows. The effect of HTP is enhanced by Canon's 14-bit A/D converter, which provides finer tonal gradations than the previous 12-bit system. HTP is a Custom Function with a simple on/off setting, and the available range of ISO speed settings is slightly limited when it is on. Take a look at the following sample images that show the capabilities of Highlight Tone Priority:



Highlight Tone Priority is at its best with high-key subject matter like these white flowers. Photos by Jeff Greene for Canon USA.

Auto Lighting Optimizer

Auto Lighting Optimizer (ALO) analyzes contrast in captured images and modifies both shadows and highlights via tone curve adjustments to minimize loss of detail in contrasty lighting conditions. Current EOS models including the EOS-1D Mark IV, 5D Mark II, 7D and Rebel T3i/T3/T2i/T1i provide 4 settings for ALO: Off (Disable), Low, Standard and Strong. ALO can be used at any ISO speed setting. Sample images showing the effect of ALO can be seen here:



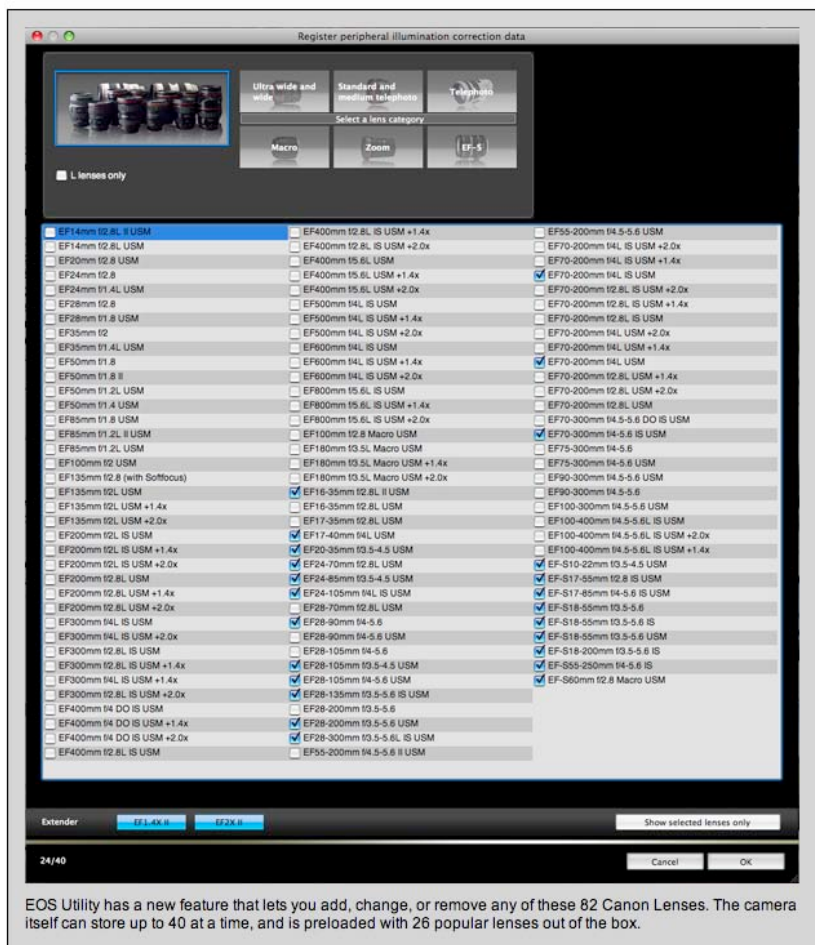
Auto Lighting Optimizer helps to preserve shadow detail without clipping highlights in contrasty lighting conditions. Photo by Canon Explorer of Light Stephen Wilkes.

Peripheral Illumination Correction

Now available on all current EOS models, this feature improves evenness of illumination from edge to edge. Compatible EOS models can store PIC data for up to 40 EF and EF-S lenses. Canon's supplied EOS Utility software contains PIC data for more than 80 lenses, and is updated when new lenses are introduced.



This setting improves evenness of illumination at the corners of the image. Photo by Jeff Greene for Canon USA.



EOS Utility has a new feature that lets you add, change, or remove any of these 82 Canon Lenses. The camera itself can store up to 40 at a time, and is preloaded with 26 popular lenses out of the box.

Use EOS Utility software to add or subtract Peripheral Illumination Correction data for individual lenses. Be sure to update your software from Canon USA's web site to get Peripheral Illumination Correction data for new lenses. Details are available in the "EOS Creative Essentials" Class Download document.

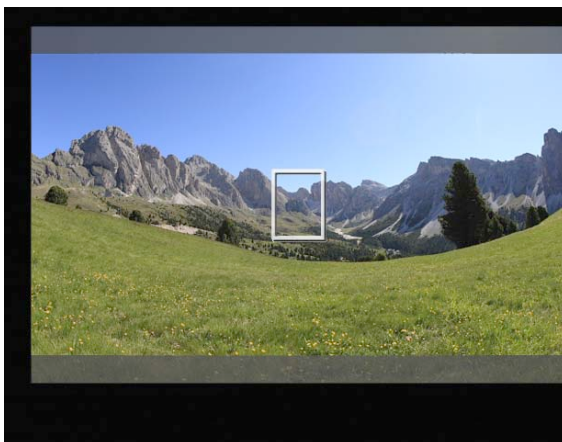
7. Other Movie Mode Setting Options

The following settings have no direct bearing on the image quality or visual effects of EOS HD video clips, but they are useful for various purposes when capturing video.

Info Display

Each time you press the INFO or DISP button in Movie mode on your HD-compatible EOS Digital SLR, you can change the amount and types of information that are displayed on the camera's LCD screen, or on a monitor connected to the camera. The cycle goes like this:

1. **Basic Display:** Semi-transparent masks for 16:9 or 4:3 video aspect ratios are superimposed on the camera's standard 3:2 aspect ratio view. A red dot appears in the upper right corner of the screen while recording. AF points may be displayed, depending on the selected focusing mode.
2. **Limited Info Display:** An exposure metering scale, a frame counter, and a battery check icon are displayed below the picture area. The shutter speed, aperture and ISO settings are displayed when you press the shutter button halfway.
3. **Full Info Display:** In addition to the limited information listed above, other camera settings including WB, Picture Style, Auto Lighting Optimizer, still image quality setting, video resolution & framing rate, memory card time remaining information, still photo framing rate, Live View AF and Movie Display or Exp. SIM mode are displayed. Most of these items except video resolution, framing rate and Movie Display/Exp. SIM icons are extinguished while recording video. The timer display shows elapsed time while recording.
4. **Live Histogram Display:** Those of you who are using EOS 5D Mark II cameras have one additional option for information display, and that is a live histogram display. In order to use it, the camera must be updated to Firmware Version 2.0.4 or higher (Version 2.0.7 is current as of June, 2010). The camera's exposure mode must be set to Manual, and the Live View 'Screen settings' submenu must be set to Movie Display. You can choose whether to display the Brightness or RGB histogram in Recording Menu 2.



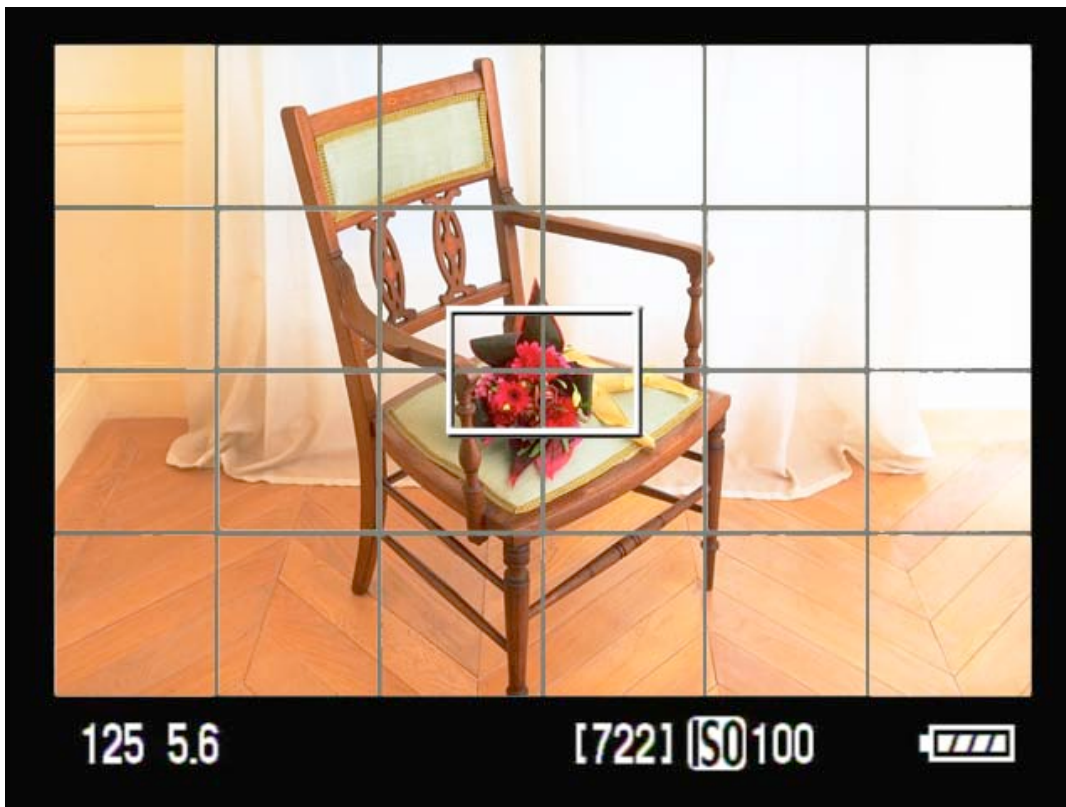
Basic Movie Display



Full Info Movie Display

Grid Display

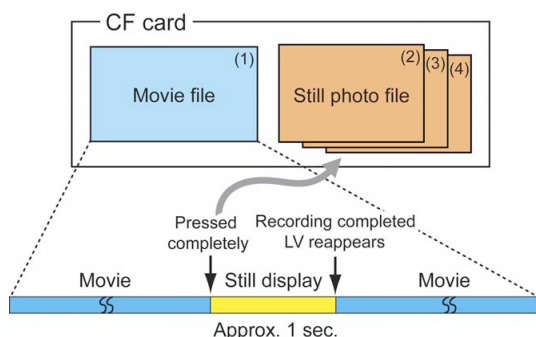
The camera's Live View of Movie Mode menu lets you choose between optional 3 x 3 or 4 x 6 overlays on the LCD screen. These overlays can be helpful for compositional purposes. Of course, they will not appear in your finished video files!



4 x 6 Grid Display

Still Image Size, Quality & Color Space

One unique aspect of HD-compatible EOS Digital SLRs is their ability to shoot a full-resolution still image, even while you're recording actual video footage.⁶ Just press the shutter button fully to take a still image (during live recording, there's about a one-second pause in the video, after which it immediately resumes recording).



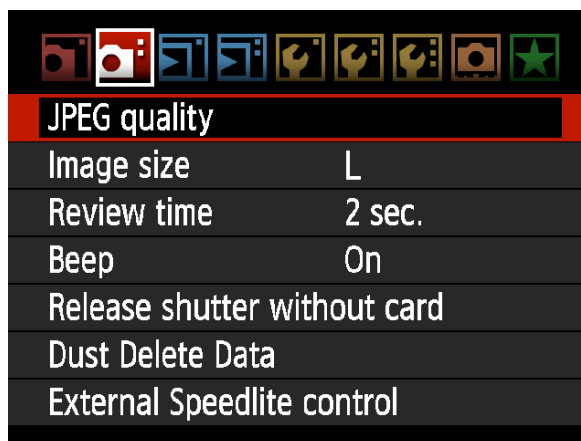
⁶ This feature is available on all HD-compatible EOS Digital SLRs excluding the Rebel T3.

Still images captured during video recording are stored as separate files on the camera's memory card.

You can set the size, quality and color space settings for still images that are captured while recording video, using settings in the camera's Recording menu, the same as you would if shooting only still images. Note that video clips are captured in sRGB color space, even when Adobe RGB is set for still captures. Finally, still images are always captured at the same exposure settings and in the same exposure mode that's currently set for video recording.

Release Shutter Without Card

This option can be found in the Recording menu for HD-compatible EOS Digital SLRs. When it is activated, it can be a lifesaver if you forget to load a memory card before attempting to record video. Of course, you'll probably want to turn this setting off while you are familiarizing yourself with camera operation. But once you're comfortable with camera operation, we recommend activating this setting for safety reasons.



Go to the Recording menu to prevent the camera from allowing you to shoot without a memory card installed.

8. Controlling Exposure & Focus

Once you have set up your HD-compatible EOS camera as desired for video capture, your next goal is to set exposure and focus. In this section, we analyze the options for each of these HD Video Capture Basics.

ISO, Shutter Speed & Aperture

These are the three main exposure controls for video capture in the EOS System. ISO speed controls the sensitivity of the image sensor, while shutter speed controls the appearance of subject motion and aperture is one of the controlling factors for depth of field. With all current HD-compatible models except the Rebel T1i, ISO can be controlled manually or automatically. (It's auto only on the T1i.) Similarly, shutter speed and aperture can be controlled manually or automatically with most HD-compatible EOS Digital SLRs. In addition, the EOS 5D Mark II offers Shutter-Priority and Aperture-Priority semi-automatic exposure control when the camera is updated to Firmware Version 2.0.4 or higher.

- **Shutter speed is perhaps the most important setting to choose first when planning your video project.**

As a rule of thumb, many professional videographers like to set their shutter speed at twice the framing rate for the most natural looking subject movement effect. For instance, 1/48 would be the optimum shutter speed for a frame rate of 24P. 1/50 is the closest available shutter speed setting in the EOS system for this purpose. Similarly 1/60 or 1/125 would be standard shutter speed settings for 30P or 60P, respectively. At 1080p in low light, you can drop the shutter speed as low as 1/30 to increase brightness. You can set shutter speeds as high as 1/4000 to control exposure in bright conditions, but you'll find that anything higher than approximately 1/125 will cause an unnatural, strobed effect with moving subjects. This technique was employed very successfully in the opening scenes of Stephen Spielberg's classic war movie, "*Saving Private Ryan*," but it's often inappropriate for conventional video recording other than sports action. Many pros use Neutral Density filters on their lens, a dark gray filter that cuts back light, to allow slower shutter speeds and smooth video in daylight conditions (more on that below).

- **Aperture values are also critical to the look of a video clip.**

Select your aperture with care when shooting video. The same depth-of-field characteristics you would get with a given lens when shooting stills will apply to video images captured with your HD-compatible EOS Digital SLR. As previously noted, wider apertures help to create shallow depth of field, which makes it easier to draw the viewer's attention to your sharply focused main subject. Smaller apertures create deeper depth of field which can sometimes be helpful, but it can also make background elements more distracting than they should be.

For a variety of reasons including optical clarity as well as matters of artistic expression, it is usually best to avoid stopping down the lens much more than about 2 to 3 f/stops below maximum aperture. Overall sharpness may be degraded due to optical diffraction effects at apertures smaller than f/11.

If the video exposure is being set automatically, bear in mind that once the camera initially sets a lens aperture, it will try to hold that aperture for as long as it possibly can, to avoid issues with audible noise as the lens aperture changes during recording, and to avoid possible jumps in exposure.

- **Since shutter speeds and apertures tend to be restricted to a range of specific values for artistic expression, ISO becomes the main variable to control overall exposure levels during video capture.**

Fortunately, in the case of the EOS System, the range of usable ISO settings is much greater than it is with most other HD capture devices. This is a by-product of the large image sensors and relatively large photodiodes (sensor pixels) used by HD-compatible EOS Digital SLRs. With EOS, you can get great results with very low noise even at ISO settings up to 1600 and higher. This is one of the main reasons why low-light EOS HD footage looks so clean and relatively noise-free compared to other cameras with smaller sensors.

If you're shooting with Manual exposure control, you can set ISO manually (many pros do), or you can manually set a reasonable shutter speed and aperture, and let the camera automatically vary ISO to adjust for changes in light. In any of the camera's automatic exposure modes (including Shutter-Priority and Aperture-Priority modes with the EOS 5D Mark II, using camera firmware v. 2.0.4 or higher), *ISO is always set automatically, and cannot be manually locked-in by the user.*

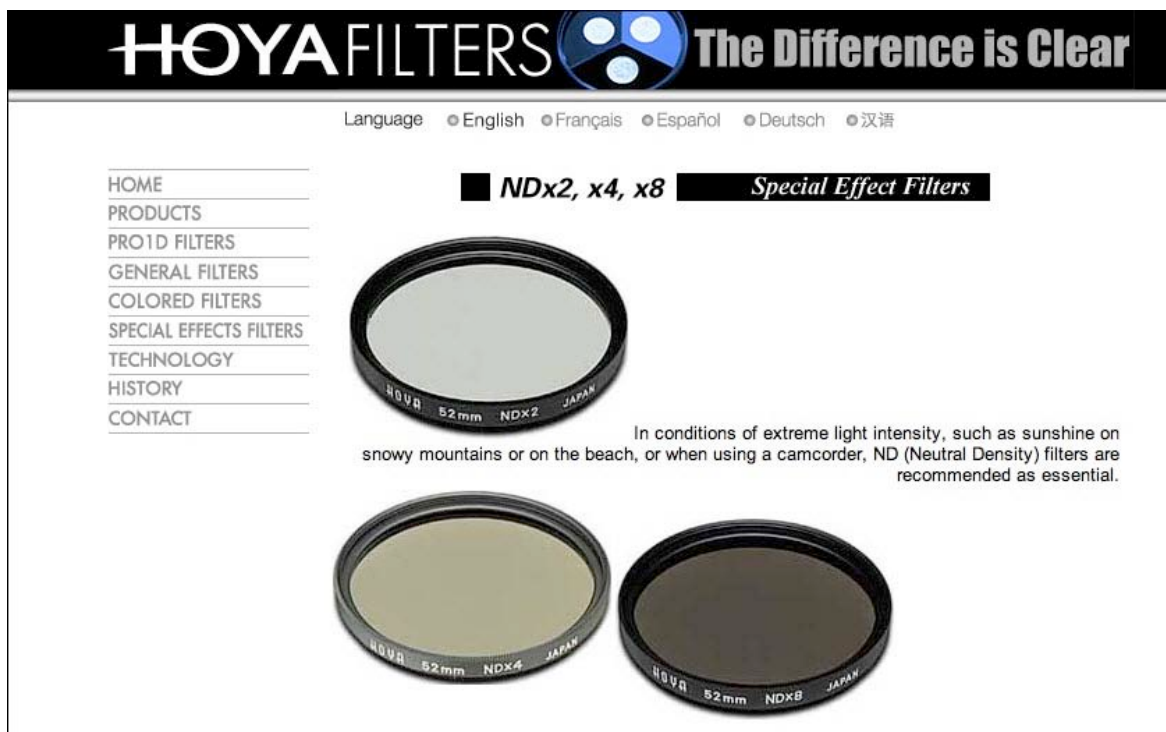
Note that manual ISO speeds can be set in 1/3-step increments with most current HD-compatible EOS Digital SLRs. The exceptions are the EOS Rebel T3i and T2i, which are limited to ISO speed settings in full stop increments, and the EOS Rebel T3, which is limited to automatic ISO speed settings.



ISO settings can be made directly in Live View by pressing the camera's ISO button and rotating the main dial.

Neutral Density (ND) Filters

We have already established the reasons why relatively large apertures and mid-range shutter speeds are desirable for video capture. But anyone who tries to use these settings in bright lighting conditions runs into an immediate problem: The ISO cannot be set low enough to produce an accurate exposure at the desired shutter speed and aperture settings. The workaround for this conundrum is the use of neutral density (ND) filters. These optical filters reduce the amount of light entering the lens, but they don't affect color values. ND filters usually mount to the front of your lens, or in the case of EF super-telephoto lenses, they fit into holders that are inserted in the middle of the lens. Incidentally, Canon USA no longer sells ND filters, but they are available from a variety of independent suppliers such as Tiffen, Hoya, B + W, and Heliopan.



Hoya is one of several independent manufacturers that offer ND filters. Web page courtesy of Hoya Filters.

- **ND filters are available in a variety of sizes and configurations to meet the needs of videographers.**

Most EF lenses are compatible with screw-in filter sizes ranging from 52mm to 82mm depending on the lens. Some shooters will invest in different strength ND filters in only the size to accommodate their largest-diameter lens, and use commercially-available step-down rings to attach the filters to smaller-diameter lenses. However, it takes time to attach or remove a screw-in filter, so professional videographers sometimes prefer to use a matte box. This accessory is placed at the front of the lens, and it often contains a bellows unit that acts as an adjustable lens hood. But more importantly for video applications, matte boxes usually have a slot that allows rectangular ND filters to be inserted or removed very quickly and conveniently.

- **ND filters are typically rated in terms of their light absorption. How much light do we need to cut?**

Let's think about this for a moment. In bright sunlight, the correct exposure is almost always equivalent to a shutter speed of 1/ISO at f/16. So, at ISO 100, which is the EOS camera's lowest available ISO setting for video, the correct exposure in bright sunlight without an ND filter is going to be 1/100 at f/16. If we want to shoot at 1/50 because we're setting the framing rate to 24P, the required aperture becomes f/22. But f/22 often creates much more depth of field than we want, and optical diffraction at this aperture is likely to limit the sharpness of the image to some degree. Let's say that we would prefer to shoot at f/5.6 instead of f/22. In that case, we will need an ND filter that absorbs 4

stops of light to compensate for the difference between f/5.6 and f/22. Here's how to select the most appropriate ND filter based on its light absorption strength:

Light Absorption Strength	ND Filter Specification (Base 10 Logarithmic Scale)	ND Filter Specification (Linear Scale or Exposure Factor)
1 stop	0.3	2X
2 stops	0.6	4X
3 stops	0.9	8X
8 stops	2.4	256X

Standard ND filters are rated at one specific strength, but recently an independent filter manufacturer (Singh-Ray) has begun offering a variable strength screw-in ND filter that provides stepless adjustment of light absorption between 2 to 8 stops. For more information, please visit Singh-Ray's web site:

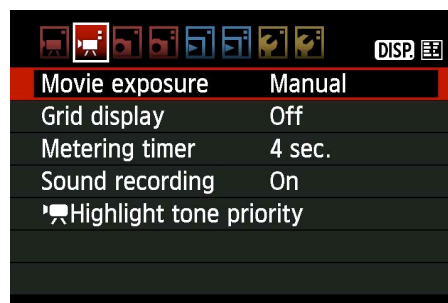
<http://www.singh-ray.com/varind.html>

Manual vs. Auto Exposure

All HD-compatible EOS Digital SLRs provide fully automatic exposure control during video capture, and all except the Rebel T3 now feature fully manual exposure control for video.⁷ Although automatic exposure is convenient for casual users, Manual exposure provides far more creative control, because it allows users to lock in exposure settings regardless of changes in light levels or the reflectivity of subject matter while recording. Here's how to access Manual exposure control for video capture according to model:

- **EOS Rebel T3i and T2i⁸**

When the Mode Dial on top of the camera is set for Movie mode, press the MENU button and locate Recording Menu 2. Highlight 'Movie exposure' at the top of the list and select Manual. Press the shutter button halfway to extinguish the menu display and resume Live View. Adjust ISO settings by rotating the main dial after pressing and releasing the ISO button. Adjust apertures by rotating the main dial while pressing the Av button, and adjust shutter speeds by rotating the main dial without operating any other controls. *Do not turn the Mode Dial to "M"* — this instantly takes you out of movie mode altogether, and sets you for still image shooting with Manual exposure.



EOS Rebel T2i Movie Exposure Menu

⁷ The EOS 5D Mark II requires Firmware Version 1.1 or higher for manual exposure control during video recording.

⁸ Movie mode manual exposure setting instructions for the new EOS 60D are almost the same as for the Rebel T3i and Rebel T2i, except that the manual exposure setting is in Recording Menu 1 and apertures are set with the Quick Control Dial rather than the Main Dial.

- **EOS 7D**

Set the Mode Dial on top of the camera to “M.” Turn the Live View/Movie Shooting Switch to the left towards the red movie camera icon to activate the Movie Shooting display. Adjust ISO settings by rotating the main dial after pressing and releasing the ISO button. (Remember that ISO can only be adjusted if the Mode Dial is set to “M” when the camera is set to video mode.) Adjust apertures by rotating the quick control dial on the back of the camera, and adjust shutter speeds by rotating the main dial without operating any other controls.



EOS 7D Live View/Movie Shooting switch

- **EOS 5D Mark II**

Set the Mode Dial on top of the camera to “M.” Make sure that Live View shooting is enabled in the menu and that the ‘Screen Settings’ submenu is set to ‘Movie Display.’ (These steps are critical.) Press the Live View button to activate the Movie Shooting display. Adjust ISO settings by rotating the main dial after pressing and releasing the ISO button. Adjust apertures by rotating the quick control dial on the back of the camera, and adjust shutter speeds by rotating the main dial without operating any other controls.



This setting is critical for manual exposure control in video mode with the EOS 5D Mark II.

- **EOS-1D Mark IV**

Press the Mode button on top of the camera and rotate the main dial or the quick control dial to select M (manual exposure mode) in the top LCD data panel. Go to the Live View menu and select Movies. Press the shutter button halfway to extinguish the menu screen, then press the SET button to activate the Movie Shooting display. Adjust ISO settings by rotating the main dial after pressing and releasing the ISO button. Adjust apertures by rotating the quick control dial on the back of the camera, and adjust shutter speeds by rotating the main dial without operating any other controls.

Live View/Movie func. set.	
LV   set.	Movies
AF mode	Live mode
Grid display	Off
Movie rec. size	1920x1080 
Sound recording	On
Metering timer	16 sec.
MENU 	

Select Movies in the EOS-1D Mark IV's Live View mode before attempting to record video.

Focusing in Movie Mode

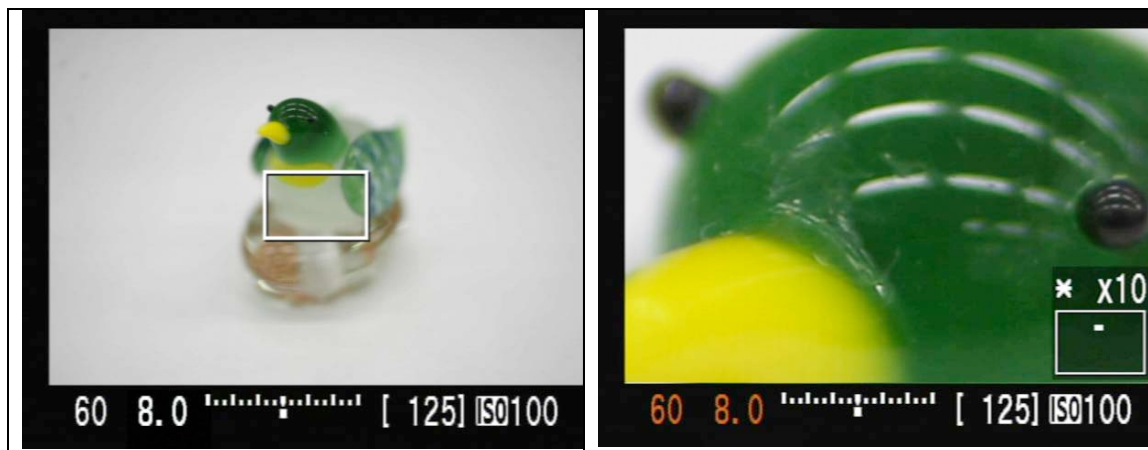
Focusing is a powerful creative tool in both still and moving images. Along with composition, movement, and lighting, focus helps to manipulate your viewers' eyes to the most important element of the frame.

It is possible to focus a Canon EF lens manually or automatically while capturing a movie with an HD-compatible EOS Digital SLR. For example, when the EOS-1D Mark IV, 5D Mark II, 7D, 60D or Rebel T21/T1i is set for Live Mode AF or Face Detection Live Mode AF in Live View, it is possible to autofocus the lens before or during a video clip by pressing the camera's AF ON button. However, we recommend focusing before the movie begins for the following reasons:

- The speed of AF in these modes may seem slow to the average viewer if it is performed while recording video.
- Live Mode AF with or without Face Detection is a locking type of autofocus; it cannot track a subject moving towards or away from the camera.
- Depending on the lighting conditions, there may be a momentary change in exposure level while AF is being performed.
- If you are using the camera's internal microphone, it will pick up the sound of the lens's focusing motor or Image Stabilizer while AF is being performed, resulting in unwanted audible noise.

Therefore, from an aesthetic perspective, you may find it more practical to autofocus the lens before recording begins. Of course, remember that it's also possible to focus manually at any time. This can come in handy when you want total control of the lens' speed and timing -- for example, to transition from a sharply focused image to a blurred one (or vice versa); to follow a moving subject; or to rack focus between different planes in your shot (i.e. foreground to background).

For maximum precision during manual focusing in Live View, all HD-compatible EOS Digital SLRs are equipped with a 2-stage magnification function that lets you zoom in on the area of interest. To access this feature, start by using the multi-controller or cross-keys on the back of the camera to position the focusing frame. Then press the magnification button with your thumb. The first press provides 5X magnification. A second press increases magnification to 10X, and a third press restores a full view of the entire scene. Keep in mind that the camera records the entire scene regardless of the manual focusing magnification setting.



Live View's magnification function is ideal for checking critical focusing accuracy.

IV. Video & Audio Recording

1. Video Recording

Once the Movie Shooting display is activated, here's how to start and stop video recording according to model:

- **EOS 60D, Rebel T3i, Rebel T3, Rebel T2i**
Press the Movie Recording button to the right of the viewfinder eyepiece.
- **EOS 7D**
Press the Start/Stop button to the right of the viewfinder eyepiece.
- **EOS 5D Mark II**
Press the SET button at the center of the Quick Control Dial.
- **EOS-1D Mark IV**
Press the FEL button next to the shutter button. A note to EOS-1D Mark IV owners: there's a cool short-cut for video shooting you may want to try. With Custom Function IV-11-1 active, you'll instantly activate both Live View and actual video recording simultaneously by simply pressing the FEL button. Press the FEL button a second time to stop recording.



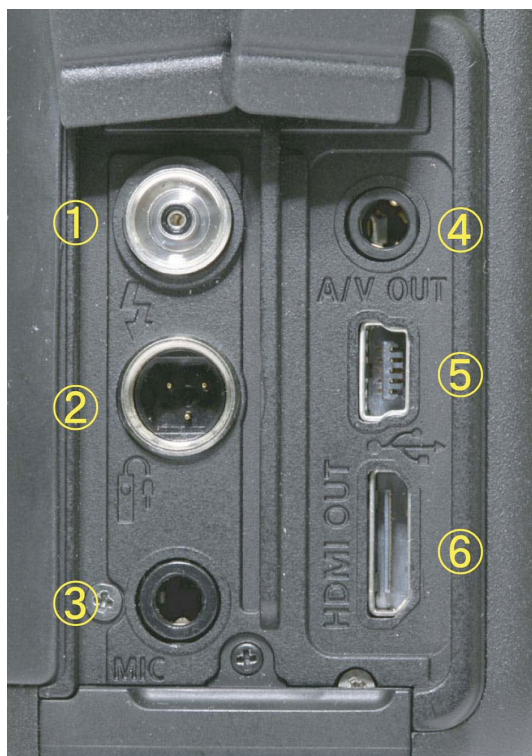
Start capturing video immediately with the EOS-1D Mark IV by pressing the FEL button when Custom Function IV-11-1 is set.

2. Clip Length

Maximum file size for individual video clips with all current HD-compatible EOS Digital SLRs is limited to 4GB. This equates to maximum individual clip lengths of approximately 12 minutes in 1080p or 720p. Maximum individual clip length increases to approximately 24 minutes in SD (standard definition) video mode. If you use a high capacity memory card, 16GB for example, you can record multiple video clips adding up to approximately 48 minutes of HD material, but no individual clip can exceed 4GB. There are both technical and marketing reasons for this limit, but regardless of the reasons, the 4GB limit is an unchangeable specification for every current HD-compatible EOS Digital SLR.

Incidentally, to dispel a persistent myth, heat build-up inside the camera body has nothing to do with the 4GB limit on individual video clips. You are free to start recording a new clip immediately after the previous one ends.

3. Video Monitoring



5D Mark II interface panel

1. PC Terminal
2. Remote control terminal
3. External microphone input terminal
4. Audio/video OUT terminal
5. Digital terminal (USB)
6. HDMI OUT terminal

Other than the camera's LCD screen, there are at least four ways to monitor video while you are recording it with an HD-compatible EOS Digital SLR.

- One of the most popular methods is to connect an HD monitor to the camera's built-in mini-HDMI port. Be advised that this method will typically require an adapter to connect the camera's mini-HDMI terminal to a standard HDMI cable. Additionally, there are variations according to camera model in terms of the resolution of the video signal coming from the camera's HDMI port depending on whether the camera is in playback mode, standby mode, or during video capture.
- Another video monitoring method is to connect a standard definition TV monitor to the camera's A/V or video out port. This produces standard definition composite video in either NTSC or PAL modes, depending on the video output setting in the camera's playback menu.
- The third way to monitor video recording externally with an HD-compatible EOS Digital SLR is through Remote Live View using a compatible personal computer running EOS Utility software. The camera is connected to the computer either via a USB cable, or, in the case of most EOS models above the Rebel series, with the

appropriate optional Canon wireless file transmitter. This can be extremely useful, especially when the camera is inaccessible in other ways.

- A fourth way to monitor the camera's video output externally is to connect the HDMI port to a radio transmitter with a compatible receiver connected to an HDMI monitor on the other end. Canon does not supply these transmitters or receivers, but they are available in the motion picture industry. We observed such a setup during the making of the Vincent Laforet Shooters Insight project for the EOS-1D Mark IV. For a look at the end result, please follow this web link:

<http://www.usa.canon.com/dlc/controller?act=GetArticleAct&articleID=3426>

4. Remote Control

The EOS System is quite limited at the present time when it comes to remote control of video recording with HD-compatible EOS Digital SLRs. Here are the currently available options:

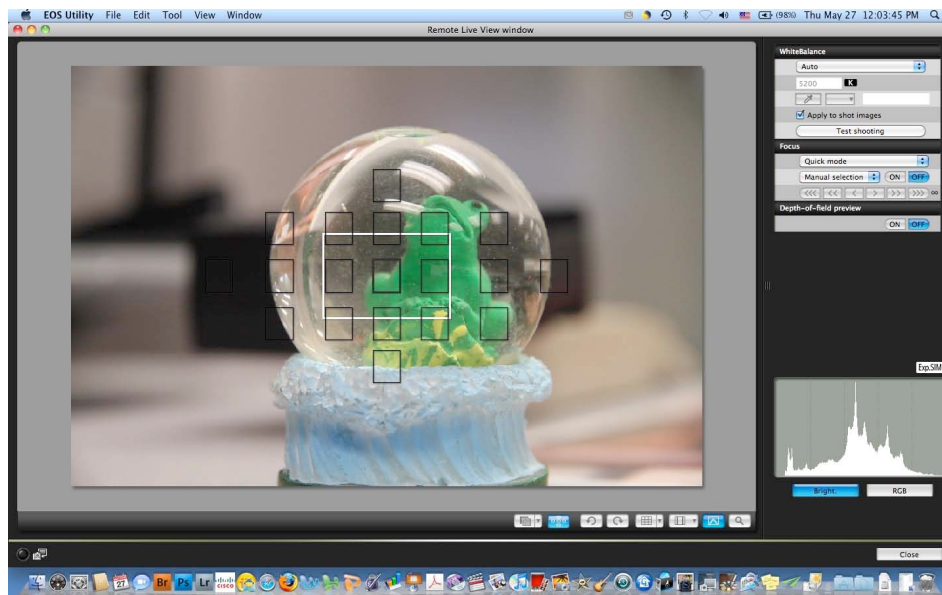
- Canon offers the optional RC-6 wireless remote controller for use with all current HD-compatible EOS Digital SLRs except the EOS-1D Mark IV. This is a small and relatively inexpensive hand-operated IR device with a maximum range of approximately 5 meters/16.4 feet. It requires a direct line of sight to the camera's IR receiver, which is usually located on the front of the handgrip. When set in its 2-second delay mode, the RC-6 will trigger video shooting when the button on the remote is pressed, assuming that remote control has been enabled in the camera's Live View or Movie Settings menu. Keep in mind that none of the current HD-compatible EOS Digital SLRs can start or stop video recording with any of Canon's current remote control cables.



RC-6 Wireless Remote Controller (Item Code 4524B001)

- Video recording can also be started and stopped from a compatible personal computer through Remote Live View. Keep in mind that when using this method, the video clips are recorded to the camera's memory card or an external USB storage device connected to the camera through an optional Wireless File Transmitter, rather than directly to the computer. Completed video files can then

be downloaded to a personal computer through the camera's USB interface or an optional Wireless File Transmitter.



EOS Utility's Remote Live View Window

- Various custom rigs developed by independent manufacturers are designed to start and stop video recording remotely with HD-compatible EOS Digital SLRs. These rigs typically work by means of a servo motor connected to a mechanical device that physically presses the appropriate control button on the EOS body.

5. Data Storage, Memory Cards, Power Supplies

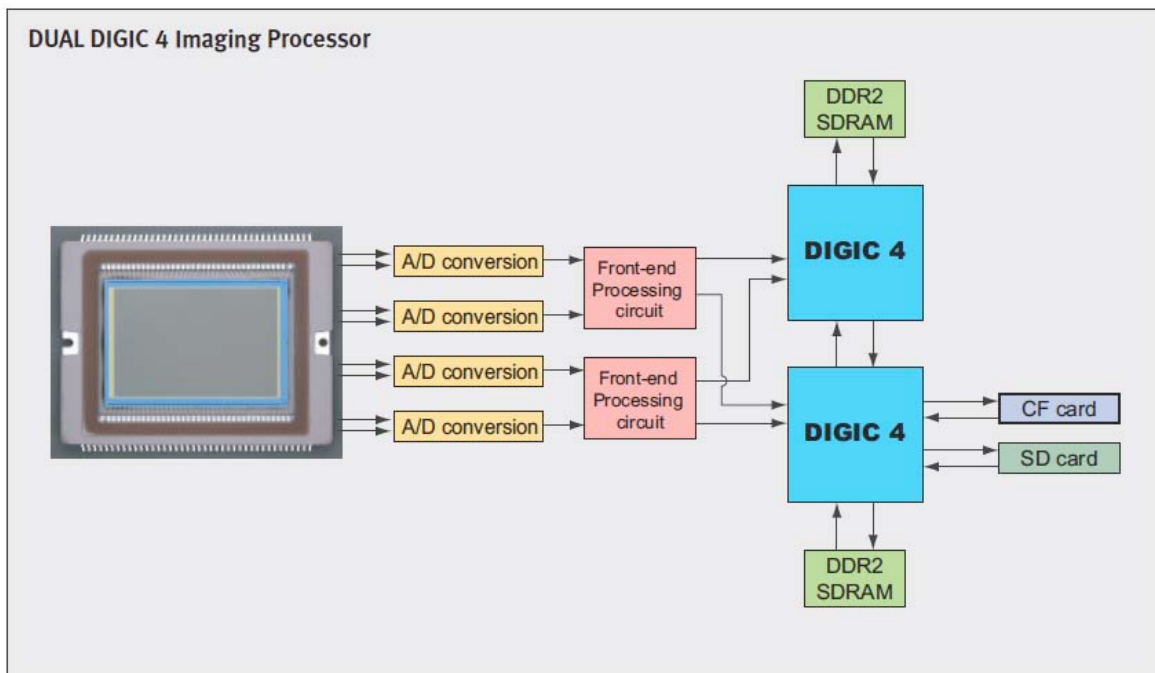
HD-compatible EOS Digital SLRs typically record video clips directly to memory cards installed in the cameras themselves. As we noted in the Feature Comparison chart at the beginning of Section II, most current models record to CompactFlash (CF) cards. The 1D Mark IV is unique within the EOS line for being able to record video clips to SD or SDHC memory cards as well as CF cards. The EOS 60D, Rebel T3i, Rebel T3, Rebel T2i and T1i record exclusively to SD and SDHC⁹, although the 60D, T3i, T3 and T2i are also fully compatible with the relatively new SDXC memory card format. Most HD-compatible EOS models above the Rebel series (excluding the 60D) can also record video clips to external storage devices when the cameras are equipped with one of their optional Wireless File Transmitter units. In this section, we will analyze each of these options.

Buffer Memory, Card Types, and Write Speeds

Video recording, especially Full HD video recording, generates tremendous amounts of image data at a very rapid rate. Even after the raw data from the image sensor has been downsampled and compressed by a high-speed image processor like DIGIC 4, the volume is so great that no current memory card technology is fast enough to accept it in real time. For this reason, HD-compatible EOS Digital SLRs are designed to feed video data

⁹ As of January, 2011, no HD-compatible EOS Digital SLRs are compatible with the UHS-I specifications for SDHC memory cards.

into a high-speed internal buffer memory circuit before it is transferred to a storage device such as a memory card.



Buffer memory circuits, identified as DDR2 SDRAM in this diagram, play an integral role in storing video data temporarily before it is written to the camera's memory card or an external storage device.

As the data is copied from the buffer memory to the storage device, the camera carefully monitors the speed at which the device is accepting the data, i.e., the “write speed.” If you use a device with a slow write speed, the camera may display a five-level indicator on the LCD screen during video recording. It indicates how much data has not yet been written to the storage device, or in other words, the remaining amount of buffer memory in the camera. The slower the write speed, the faster the indicator will fill up. If it fills up completely, video recording will stop automatically.

Most modern memory cards are fast enough to handle the flow of data from the camera's buffer memory without causing video recording to stop unexpectedly. In fact, Canon's instruction books say that a write speed of 8MB (megabytes, not megabits) per second is adequate for CF cards, or 6MB per second for SDHC cards. However, experience in the field has shown that faster write speeds are better. Generally speaking, the faster the write speed of your memory card or storage device, the better off you'll be for video recording purposes.

- **CF Cards:** Although there are various speed ratings for CF cards, the most important classification you should be looking for is UDMA (Ultra Dynamic Memory Access). There are different speed ratings within the UDMA specification, but current cards are typically rated at 45MB per second or faster. These are the best CF cards currently available for video recording with HD-compatible EOS Digital SLRs that use CF cards such as the EOS-1D Mark IV, 5D Mark II and 7D.



Sample of UDMA CF Card

- **SD, SDHC & SDXC Cards:** Original SD (Secure Digital) cards have a maximum storage capacity of 2GB, which makes them a poor choice for most video recording applications. The next step up is SDHC (Secure Digital High Capacity), which range from 4GB up to a maximum capacity of 32GB. These are more appropriate for video recording, but it's important to use a card with adequate write speed. Class 6 (representing a minimum write speed of 6MB per second) is the minimum acceptable speed rating, and Class 10 is currently the fastest speed rating available for SDHC cards. SDXC (Secure Digital Extended Capacity) is the newest classification for SD cards. According to the SD Association, which controls the standards for all types of SD cards, SDXC cards are capable of write speeds as fast as 104MB per second currently, with plans to achieve write speeds up to 300MB per second eventually. SDXC storage capacities start at 64GB and can reach a theoretical maximum capacity of 2TB. The EOS-1D Mark IV and Rebel T1i are compatible with SD and SDHC, while the Rebel T3i, T3, T2i and 60D support SD, SDHC and SDXC memory cards.



SDHC and SDXC memory cards are clearly labeled.

- **External Storage Devices:** Most current HD-compatible EOS models above the Rebel series can be equipped with an optional Wireless File Transmitter (WFT) that, among other things, acts as a USB Host. This feature enables the WFT units to accept external storage devices such as USB flash drives (also known as thumb drives, jump drives, etc.) and USB hard drives. Write speed is usually not an issue with these drives, but their main attraction is the potential for greater storage capacity than memory cards at a lower price per GB. Although simultaneous (mirrored) recording to a memory card and an external storage device is not supported, it is possible to record video directly to an external storage device through the Wireless File Transmitter. It is also possible to copy complete video clips from the camera's memory card to the USB storage device or vice versa. This can be useful if a computer is unavailable and you want to back up your data in the field.



EOS 5D Mark II with Wireless File Transmitter WFT-E4A and 500GB external hard drive. Note that this drive would require its own power supply to work with the WFT-E4A.

Compatible WFT units for current EOS HD-SLRs are as follows:

- **EOS-1D Mark IV:** WFT-E2 II A, WFT-E2A
- **EOS 5D Mark II:** WFT-E4 II A, WFT-E4A
- **EOS 7D:** WFT-E5A

AC Adapters, Battery Packs & Battery Grips

Before you start a video project with your HD-compatible EOS Digital SLRs, be sure to have enough power available to keep the cameras running as long as necessary. Here is an overview of the facts you need to know.

Camera	Battery Pack	Video Running Time (approx.)	Battery Charger	Charging Time (approx.)	Battery Grip	AC Adapter Kit
EOS-1D Mark IV	LP-E4	2.7 hours	LC-E4	2 hours	Built-in	ACK-E4
EOS 5D Mark II	LP-E6	1.5 hours	LC-E6	2.5 hours	BG-E6	ACK-E6
EOS 7D	LP-E6	1.5 hours	LC-E6	2.5 hours	BG-E7	ACK-E6
EOS 60D	LP-E6	2 hours	LC-E6	2.5 hours	BG-E9	ACK-E6
EOS Rebel T3i/T2i	LP-E8	1.5 hours	LC-E8	2 hours	BG-E8	ACK-E8
EOS Rebel T3	LP-E10	1.8 hours	LC-E10	2 hours	None	ACK-E10
EOS Rebel T1i	LP-E5	1 hour	LC-E5	2 hours	BG-E5	ACK-E5

AC Adapter Kits, available as optional accessories for all HD-compatible EOS Digital SLRs, are ideal when you have access to AC power, as is often the case for studio recording sessions. They can be used with or without a Battery Grip installed on the camera.



AC Adapter Kit ACK-E6 for EOS 5D Mark II, 7D and 60D

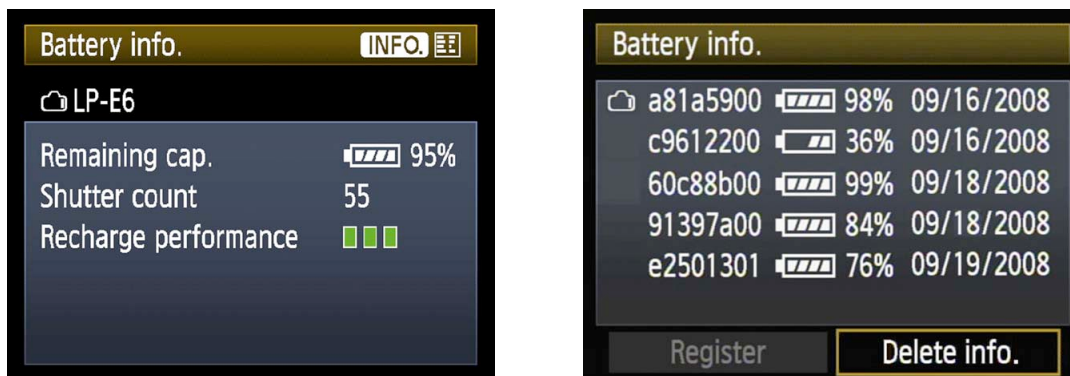
With the exception of the EOS-1D Mark IV, which uses only one battery pack, the next best alternative for extended shooting times is an optional Battery Grip, which can accommodate up to two battery packs simultaneously. With this accessory, maximum shooting time is doubled compared to a single battery pack.



Battery Grip BG-E6 for EOS 5D Mark II

The EOS-1D Mark IV, EOS 5D Mark II, EOS 7D and EOS 60D display detailed information about each battery pack you use, such as remaining capacity in 1% increments. They also display the battery pack's recharge performance level, which tells

you when it can no longer accept a charge and should be discarded. This typically occurs after approximately 350 to 500 charging cycles.



HD-compatible EOS Digital SLRs above the Rebel series display detailed battery information and can register data for up to 6 battery packs.

6. Audio Considerations

Any professional videographer will tell you that audio quality is just as important as image quality, if not more so, for most projects. With that in mind, here is an overview of the options available to you with HD-compatible EOS Digital SLRs.

Built-in Microphone

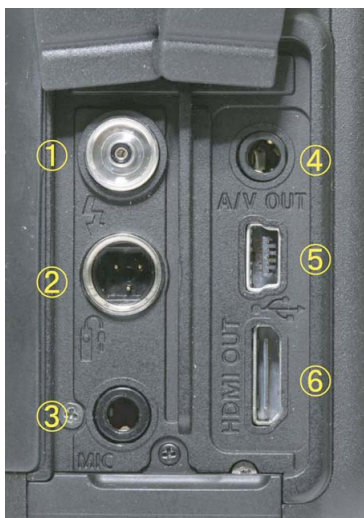
The microphone that is built into all HD-compatible EOS Digital SLRs is provided as a convenience more than anything else. It is limited to monaural recording and it uses automatic gain control that cannot be overridden except with the EOS 5D Mark II, 60D and Rebel T3i (see “Built-in Audio Level Controls” below). It is omnidirectional, so it picks up audio from every direction, but it favors sources that are close to it. This includes EF lens components such as the focusing motor, electronic diaphragm, and image stabilizer when they are operating. The built-in microphone can be effective for casual use, but for professional video projects it is at its best for recording a “scratch” audio track that can be used to synchronize second system audio. (More information on this topic can be found below in the section on **External Microphones**.)



EOS 5D Mark II Built-in Microphone

External Microphone Terminal

Available on all HD-compatible EOS Digital SLRs except the Rebel T3 and T1i, this 3.5mm diameter standard mini-plug is compatible with a variety of external microphones for stereo audio recording. It does not supply phantom power, but it records 16-bit PCM stereo audio at a frequency of 48 kHz, which is an industry standard. Canon does not currently market external microphones specifically for HD-compatible EOS Digital SLRs. However, external microphones are strongly recommended for best results with audio.



1. PC Terminal
2. Remote control terminal
3. External microphone input terminal
4. Audio/video OUT terminal
5. Digital terminal (USB)
6. HDMI OUT terminal

EOS 5D Mark II external microphone terminal is listed as number 3 in this diagram.

Note that current HD-compatible EOS Digital SLRs do not have XLR connectors built in. However, external microphones with XLR connectors can be used via optional 3rd-party accessories such as the BeachTek DXA-5DA Professional XLR Adapter. This device is normally mounted underneath the camera. It is powered by a 9V battery and plugs into the HD-compatible EOS Digital SLR's external microphone terminal. The DXA-5DA accepts up to two external microphones with industry-standard XLR connectors.



BeachTek DXA-5DA Adapter. Photo courtesy of BeachTek

For more information on the DXA-5DA, please visit the following web page:

<http://www.beachtek.com/dxa5da.html>

External Microphones

It is well beyond the scope of this document to describe all the issues concerning external microphones that can be connected to an HD-compatible EOS Digital SLR. However, it's worthwhile to know some basic information about them. Here is a quick overview.

- **Directional or Shotgun Mics:**

Available in a variety of configurations ranging from small units that fit into the camera's hot shoe to larger units that are often attached to booms, fitted with a windscreen and held close to the subject but just out of frame, directional microphones have a very narrow angle of acceptance. This helps them to filter out extraneous ambient sound so that the speaker's voice is recorded more clearly.

However, the narrow acceptance angle of directional mics means that they must be aimed very precisely at the audio source you wish to record. When used with an EOS camera, directional mics must be equipped with their own power supply, usually one AA-size battery.



Sennheiser ME66 Shotgun Microphone. Photo courtesy of Sennheiser.

- **Omnidirectional and Cardioid Mics:**

These types of microphones have an acceptance angle of almost 360°, which makes them more forgiving than a directional mic in terms of aiming them towards an audio source. Often available in handheld configurations, they're good for interviews as long as the surroundings are relatively quiet. As in the case of directional mics, omnidirectional and cardioid mics typically require built-in power



The Audio-Technica ATW-T341 is an example of a wireless hand-

supplies in order to work with HD-compatible EOS Digital SLRs.

- **Lavalier Mics:**

These are the miniature microphones that are often used for onstage presentations, television news programs and location shoots. Typically clipped to the speaker's clothing and connected to a battery operated wireless transmitter, lav mics are often a better choice than a camera-mounted directional mic when the subject is more than 10 feet away from the camera, especially in a noisy environment or if the subject will be moving around, and the camera cannot follow them at a constant distance. The wireless transmitters for lav mics are usually paired with a wireless receiver that plugs into the EOS camera's external microphone terminal.

held cardioid microphone. Photo courtesy of Audio-Technica.



*Sennheiser EW100ENG2 Wireless Lavalier Microphone System.
Photo courtesy of Sennheiser.*

Built-in Audio Level Controls

The EOS 5D Mark II, 60D and Rebel T3i are currently the only HD-compatible EOS model with manual audio level controls (firmware v.2.0.4 or higher required for this feature with 5D Mark II). All other HD-compatible models feature automatic gain control only. When you use manual audio level control, you can adjust the recording level to any one of 64 levels, using the quick control dial. This adjustment can only be done prior to recording and cannot be changed while recording.



The EOS 5D Mark II and EOS 60D provide manual control over audio levels for video recording

Audio Monitoring

None of the current HD-compatible EOS Digital SLRs supports audio monitoring while recording. However, audio monitoring is available when using certain independent accessories such as the BeachTek DXA-5DA Professional XLR Adapter, as mentioned above.

Second System Audio Recording

Also called dual system audio, this technique uses an external audio system to record and monitor sound. The camera's audio track is then replaced with the separately recorded sound track during post-processing. Second system sound requires extra work in the editing phase, but the payoff usually is potentially much better audio quality than the camera could provide on its own.



The Zoom Handy Recorder H4n from Zoom Corporation is popular among DSLR videographers for external audio recording. Photo courtesy of Zoom Corporation.

7. Artificial Light Sources and Modifiers

The exceptional low light sensitivity of current HD-compatible EOS Digital SLRs might lead some users to think that supplementary lighting is unnecessary. Although it is often possible to make a legitimate case that shooting by available light alone is the best artistic option, it is also true to say that supplementary lighting, when done well, can make the difference between an average shot and a great one. Here is a brief overview of the most popular artificial light sources and accessories for EOS HD video.

Tungsten/Incandescent

Tungsten incandescent illumination is one of the oldest and most traditional types of artificial light sources available for video, and it is likely to remain a popular choice for the foreseeable future. On the positive side, there is an immense variety of professional tungsten lighting equipment to choose from, and most rental studios are likely to have a decent selection on hand to work with. There are floodlights, spotlights, 4Ks, 2Ks, “minis” and more. On the not-so-positive side, tungsten lights require a lot of electrical power and they generate a lot of heat. After a few hours of working on set, this heat can become an issue, making it uncomfortable for actors as well as the crew.



Tungsten lighting equipment is powerful and reliable but it generates a lot of heat. Photo courtesy of Arri Group.

Fluorescent

The recent availability of powerful daylight-type compact fluorescent lights (CFL) has made it possible for many studio videographers to replace their older tungsten lights. The new CFL tubes feature “Edison” bulb-type bases so they can be fitted to various lighting fixtures. They provide ample levels of illumination, yet they are relatively lightweight and cool during operation. They also draw far less electrical power than the equivalent amount of tungsten lamps, so they are cheaper to run. Keep in mind that some of these new fluorescent lights may require Custom white balance for the most accurate color if the preset Tungsten or Fluorescent WB settings aren’t sufficient.



Compact Fluorescent Lamps have become popular for video lighting. Photo courtesy of Westcott Lighting.

LED

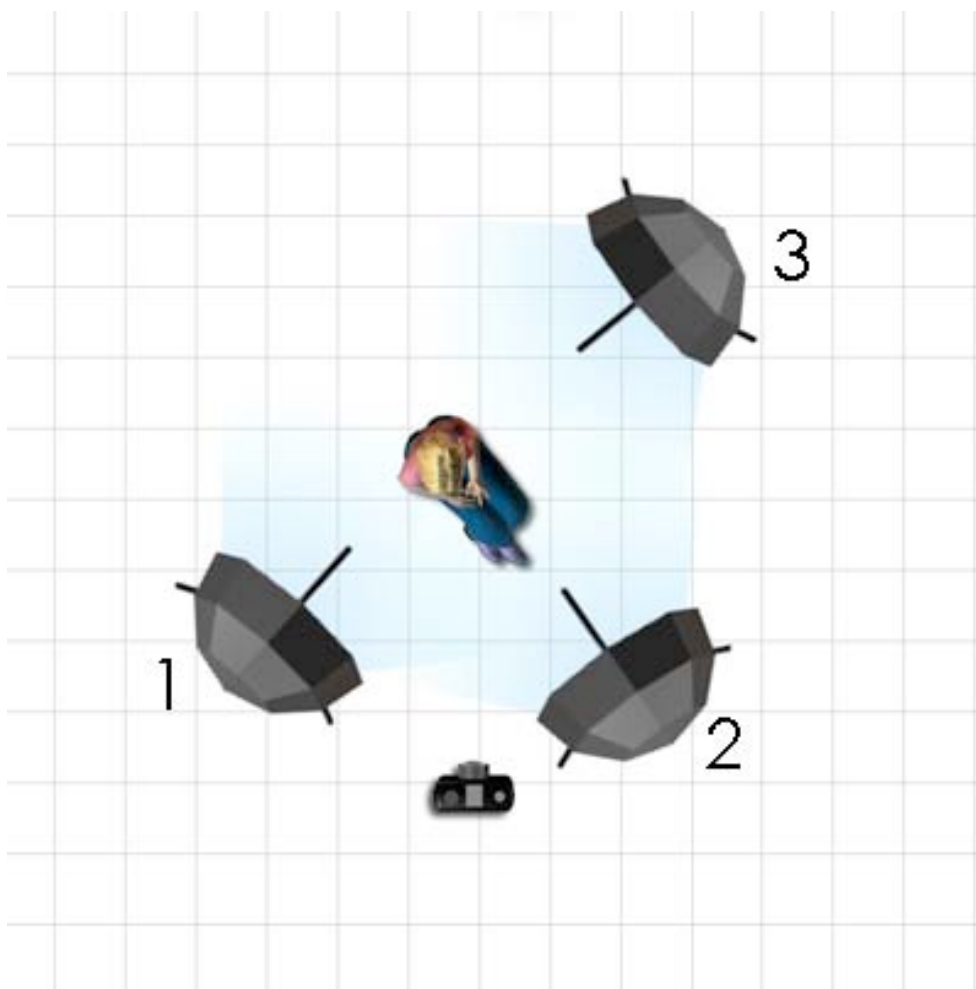
Light-Emitting Diodes (LED) are the “new kids on the block” in terms of video lighting equipment. Although they tend to be more expensive to purchase than CFLs, they are far more compact and require far less electrical power to operate. They are, in fact, so energy-efficient that they can often be operated for hours on end with AA-size batteries instead of AC power. This factor makes LEDs the lighting system of choice for many location assignments where there’s a need for supplementary lighting but AC power is unavailable. LEDs generate even less heat than CFLs, another welcome side effect. The latest generations of LED lighting units for cinema are color-corrected to produce a tungsten color balance.



LED video lighting systems are compact, lightweight, and powerful. Photo courtesy of LITE Panels.

Light Modifiers

Naturally, it’s not just the quantity but also the quality of artificial lighting that counts when it comes to professional-level video productions. This is where the topic of light modifiers becomes important. Very generally speaking, the main purposes of modifiers are either to soften the light or to make it harsher, depending on the desired effect. Soft light is usually appropriate for frontal illumination of people and products, while harsh lighting from the top or rear of the set can be effective for accenting the subject. A good professional lighting set-up for portraiture often involves the use of 3 lights with modifiers: A main or “key” light positioned slightly above and to the side of the subject, together with a secondary and weaker “fill” light positioned at eye level, and a third accent light from above and/or behind the subject to light the hair. The key and fill lights are often equipped with softeners such as light boxes, reflectors or umbrellas which in effect increase the surface area of the light source to make it softer. The accent light may use a fresnel lens or a grid to focus the light into a tighter beam. In addition to the lights, soft boxes and umbrellas, etc., there is also a need for light stands, booms or other equipment to position the lighting equipment safely and effectively.



Typical 3-light set-up for portraiture.

8. Sticks, Rigs, Sliders, Etc.

Although the need for camera stability applies to both still and video productions, the most effective methods for achieving it can vary. Additionally, for many video projects, skillful camera movement is essential to the quality of the results. For these reasons and more, it is important to understand some of the options for camera support.

Tripods and Fluid Heads

In the world of video, tripods are often called “sticks.” The two terms basically mean the same thing, three legs with a camera support on top. But video tripods tend to be heavier and more substantial than still camera tripods. This makes sense when you realize that the usage is different. Light weight is often an asset for still camera tripods, especially for field work, but for video, the heavier the tripod the better in terms of stability.

The types and styles of tripod heads also vary between still cameras and video cameras. For still cameras, usually the goal is quick movement so the photographer can reposition the camera swiftly to switch from horizontal to vertical format, or to recompose the scene. But for video, there is no need to switch the orientation of the camera from horizontal to

vertical, and quick camera moves are often the sign of an amateur production. Fluid heads are the solution to this problem. They help to keep camera movements smooth and steady, and they are much easier to control for pans and tilts.

Some of the best-known manufacturers of video tripods and fluid heads include Sachtler, Gitzo, and Manfrotto.

<http://www.sachtler.com/>
<http://www.gitzo.com/>
<http://www.manfrotto.com/>

Tripod-Mounted DSLR Rigs

For still photography, it's fairly normal to mount a bare camera body with a short lens or in the case of a long lens, a tripod collar with a quick-release plate to a tripod head and call it a day. It is certainly possible to do the same thing when capturing video with an HD-compatible EOS Digital SLR, but many professional videographers prefer to use custom-made rigs instead. These rigs allow the videographer to attach useful accessories such as an external video monitor, a zoom ring, a focus ring and a matte box, etc.



Charles Papert designed this tripod rig for the EOS-1D Mark IV. Photo by Chuck Westfall/Canon USA.

DSLR Shoulder Rigs

In situations where tripod use is impossible, inconvenient, or unwanted for artistic reasons, the use of shoulder-mounted camera supports, or shoulder rigs for short, is popular for HD-compatible EOS Digital SLRs. It seems as if there are dozens if not hundreds of these rigs on the market today, and new ones frequently appear. There is a

wide range of prices and feature sets, but the better products tend to be lightweight, sturdy and modular.

The basic concept of a shoulder rig is to provide a platform that can be held with one or two hands, so as to stabilize the camera while holding it in a comfortable position for eye-level viewing. Since EOS HD Video is shown on the camera's LCD screen rather than through the optical viewfinder, it has become popular to mount loupes behind the screen to magnify the view and make it easier to see.



This is an example of a shoulder rig for digital SLRs. Photo courtesy of Red Rock Micro.

Hand-Held Rigs

When tripods are inconvenient but shoulder rigs don't position the camera low enough for a good shot, hand-held rigs become an attractive alternative. These devices tend to be smaller and lighter than shoulder rigs, but they make the camera easier to stabilize when shooting from low angles. Some hand-held rigs can be fitted with external video monitors that make it easier to see what's being shot.

Rig Manufacturers

Some of the more popular rig manufacturers for EOS HD SLRs include Cinevate, iDC PhotoVideo, Red Rock Micro, and Zacuto.

<http://www.cinevate.com/>
<http://www.idcphotovideo.com/>
<http://www.redrockmicro.com/>
<http://www.zacuto.com/>

These are far from the only suppliers of DSLR rigs, but all of them are popular with pros.

Steadicam®

When shoulder rigs or hand-held rigs aren't steady enough but tripods are too immobile, Steadicam® rigs can be very useful. There are several varieties, varying mostly on the weight of the camera/lens combination. For HD-compatible EOS Digital SLRs, the Pilot™ and Merlin™ versions are usually suitable.



Charles Papert demonstrates use of Steadicam rig. Photo by Chuck Westfall/Canon USA.

For more information on Steadicam products, please visit their website:

<http://www.steadicam.com/>

Dollies & Slider Rigs

These devices have been around for as long as movies have been made, so there's nothing particularly new about them. But now that HD-compatible EOS Digital SLRs are getting beyond the early-adopter stage, many EOS videographers are finding ways to use dollies and slider rigs.

- Dollies tend to be expensive and heavy devices that require a crew to set up and operate, but they are unique in their ability to achieve a variety of unusual camera angles and smooth moves that create a sense of motion. Think of a camera moving alongside a subject like a runner or moving car, which is common in professional video today. Dolly moves can be simple or complex; when they are done skillfully, the viewer often doesn't even notice them. For example, they can start from a high position and move lower or vice versa.
- Slider rigs are much simpler than dollies, but they provide an easy way to add lateral or circular movement to a video clip. Consisting of a pair of rails and a camera mounting platform, slider rigs are sometimes mounted to one, two or more sets of "sticks."

Loupes, External Monitors, Focusing Wheels, Matte Boxes, etc.

These optional accessories make life a lot easier for camera operators and focus pullers.

- Loupes are optical magnifiers with housings that mount to the LCD screen of an HD-compatible EOS Digital SLR. They usually have diopteric adjustment built in to compensate for variations in eyesight, and are ideal for eye-level viewing with shoulder rigs.



Loupes and focusing wheels make hand-held camera operation much more convenient when recording HD video with EOS Digital SLRs. Photo courtesy of iDC Photo Video.

- External video monitors are extremely useful accessories for HD-compatible EOS Digital SLRs. Large HD monitors work best in studio situations, while compact portable LCD monitors are more appropriate for field work. In addition to providing a larger view of the scene, portable monitors can be angled towards the videographer for greater viewing convenience.
- Focusing wheels, sometimes called follow-focus mechanisms, are used to make manual focusing more precise and easier to operate without jarring the lens while recording video. They are often designed to be marked with two or more preset distance settings. This makes it easier for the focus puller to rack focus from a far subject to a near one, or vice versa.
- Matte boxes are multi-purpose devices designed to be mounted in front of the lens. They usually incorporate bellows-type adjustable lens hoods that can be shortened or lengthened according to the angle of view of the lens. They also typically have slots at the rear end that accept custom-made filters, masks or gels for exposure control and creative visual effects.

V. Conclusion

The more you get involved with EOS HD Video, the more rewarding it can be. We hope that these class notes will help you familiarize yourself with the basics for HD Video capture with EOS Digital SLRs, and we encourage you to experiment and practice using your Canon equipment.

Our objective has been to provide more depth on each of the topics that were covered during the live presentation, because there's obviously a limit on how much can be said within 90 minutes. Please feel free to contact us if you have further questions on these topics, or anything else that we covered during the Seminar.

<http://www.usa.canon.com/dlc/controller?act=GetArticleAct&articleID=2068>

Please select "Contact Us" near the bottom of this page to ensure that your questions or comments are routed correctly. Thanks for using Canon photographic equipment. We appreciate your business!

Sincerely,

Canon U.S.A., Inc.
Canon Live Learning

ⁱ Actual selling prices are set by authorized dealers and may vary.

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About Canon Live Learning

The Growing Demand for Imaging Education

With the democratization of personal imaging made possible by the digital revolution, many of Canon's customers have felt empowered to do more, be more expressive and communicate more effectively via Canon personal imaging products. This empowerment has stimulated an ongoing and intense demand for imaging education.

Meeting the Needs of our Customers

In 2008, we here at Canon USA set out to provide our loyal and passionate advanced amateur customers with an exclusive, Canon-centric choice in on-site photo education. From the beginning, we envisioned Canon Live Learning (CLL) as a new kind of intensive and high-quality photographic educational experience, with Canon's proven photographic expertise as the leading selling point and Canon professional imaging products as the demonstrated tools of choice throughout the workshops and seminars. Industry-leading instructors and top-grade venues are also hallmarks of the program. As CLL has evolved, we have expanded our offerings to appeal to professional photographers and videographers as well as advanced amateurs.

Growing Customer Relationships



Seeking to expand the Canon ownership experience beyond a purely product-based connection, CLL engages customers directly within their respective quests for personal growth in the imaging disciplines they love. Meeting and working together with our customers in high-context and high-quality settings has proven to be mutually beneficial: Customers obtain top-quality education, while Canon gains invaluable direct feedback resulting in new products that are ever more closely aligned with customer wants and needs. Customers value and enjoy the direct connection with Explorers of Light and other Canon experts as they learn about the subjects that mean the most to them. Our experts help them take better landscape photos and portraits; master their Canon Speedlites; create better HD video projects; and make better prints. The intimacy of those learning connections, combined with the ready availability of the Canon personal imaging products that they already love improves their ownership experience in ways that cannot be realized in even the most elite independent photo workshops.

Keeping in Touch

- Our home page on the Canon Digital Learning Center is here: <http://usa.canon.com/canonlivelearning>
- You can also follow us on Facebook here: <http://on.fb.me/hX85ZP>
- CLL welcomes feedback, comments and questions by e-mail here: canonlivelearning@cusa.canon.com
- If you are interested in more information about Canon Live Learning, or if you just want to keep up to date on Canon events and activities that may be offered in your area, we encourage you to sign up for the EOS Newsletter here: <http://bit.ly/fX0xC8>

About Canon Live Learning

Offering More Choices in More Places

As CLL enters its third full season in 2011, the program has expanded to encompass a wider range of subject matter and to reach a bigger audience than ever before. Key offerings include:

- **EOS Immersion Seminars & Workshops:** EOS Immersion Saturday Seminars are full-day events consisting of individual presentations on Creative Essentials, Speedlite Creativity & Techniques, HD Video Basics, and Travel & Landscape Photography. Professional photographers and Canon Explorers of Light perform live demos on stage and deliver inspiring multimedia presentations for up to 200 attendees. Offered separately, EOS Immersion Sunday Workshops provide a full-day hands-on educational experience for up to 16 attendees. Topics vary by city, but typically students can choose workshops on Speedlite Techniques or HD Video. Occasionally, there are EOS Immersion Sunday workshops on nature photography, urban landscapes or other topics. Ten EOS Immersion weekends are scheduled to date in 2011.
- **EOS Destination Workshops:** Unlike the EOS Immersion Seminars and Workshops which are typically offered in major metropolitan areas, EOS Destination Workshops are usually held in intriguing locations that have been chosen specifically for their natural beauty. In 2011, Canon is offering at least 9 EOS Destination Workshops in scenic locations such as Moab, UT; Bar Harbor, ME; Sedona, AZ; and Montrose, CO among others. These are 2-day hands-on shooting workshops conducted by award-winning professional photographers and Canon Explorers of Light including Bruce Dorn, George Lepp, Arthur Morris, Ken Sklute, Tyler Stableford, and Jennifer Wu. Subjects will include Tilt-Shift lenses, Environmental Portraiture, Sunrise/Sunset Photography, and even Hot-Air Balloons. Attendance is limited to 16 students, providing an exceptionally intimate learning environment.
- **Professional Track:** In 2010, Canon Live Learning offered two different series of multi-day workshops geared towards professional videographers: The 2-day Canon Cinema Caravan series developed in conjunction with *stillmotion* and the 3-day EOS Moving Image series developed in conjunction with *Createasphere*. Look for additional CLL workshops designed for professional image-makers in 2011. Details and scheduling will be announced on the Canon Digital Learning Center web site.

