

A practical guide to the feature set of the Canon XL H1

Version 1.0

INTRODUCTION:

The XL H1 HD camcorder has a similar appearance to Canon's XL1 and XL2 models, and has many of the same features, but offers a much broader range of capabilities, emulating those of cameras that are significantly more expensive.

With the "Professional Backpack" on this camcorder you can: send out an uncompressed HD signal (through the HD-SDI terminal), input and output SMPTE time code and receive a Genlock signal. And with the XL H1, you are capturing these images through genuine Canon optics, which rank among the very best in the world.

Of course, this camera offers interchangeable lenses and the "open architecture" that has become a hallmark of Canon's XL series of camcorders. But that's just where the creative flexibility begins. With the Image control functions of the XL H1 at your fingertips, you can enjoy unparalleled control over your image. From luminance to color saturation to latitude, every aspect of the image can be manipulated to deliver whatever "look" best suits your needs.

This practical guide to the XL H1 is intended to be a constant companion for the owner's manual. This guide will not get bogged down in the details of how to turn a particular feature on or off, but instead discuss the circumstances under which each feature may be used, in order to unleash the full potential of your production. In other words, we will endeavor to discuss each item from the point of view of "WHY" rather than "HOW".

OVERVIEW:

With so many buttons, knobs, and menu items, the Canon XL H1 could seem rather intimidating to a new user. However, as you begin to familiarize yourself with each professional feature, it will quickly become evident that everything is laid out in a very convenient manner.

This guide divides the XL H1 HD camcorder into the following sections:

1. The lens
2. The camera body (image controls)
3. The camera body (audio controls)
4. Input and output jacks
5. The menu

SECTION 1: THE LENS

In a world where format technologies are constantly evolving, one of the most important components is the lens. Canon is known as a high-end optics company, first and foremost. Canon's lenses are indisputably among the very best in the world. At the end of the day, it doesn't really matter what technological magic is happening behind the lens—or what creative genius is unfolding in front of it, for that matter—if the glass through which the light is passing is not manufactured to the very highest of standards.

The impressive pedigree of the lens that comes standard with the Canon XL H1 is immediately evident by the black finish and red stripe around the front element. This is the color code that marks Canon's professional Cine-Style HD broadcast lenses. The XL H1 boasts a new 20x HD fluorite lens that features a new SR multi-coating. This coating minimizes ghosting and veiling of the image, and ensures the highest level of resolution and color fidelity. The focal length range of the standard lens is equivalent to 38.9-778mm (in 35mm photography terms).

INTERCHANGEABILITY AND THE XL MOUNT: One of the most useful and desirable features that distinguishes the XL line of camcorders is the interchangeable lens system. This flexibility of optics opens the door to total creative freedom, which is further enhanced by a number of adaptors that are available for the camera's XL mount. The EF Adaptor, for example, will allow you to use any of the Canon still-camera lenses in the EF or EOS series. Keep in mind that these lenses were designed for a larger target area, so there will be a 7.2x magnification (in 16:9 aspect ratio shooting) when using them on the XL H1. Thus, a 100mm lens will become a 720mm lens. Certainly, this is ideal for any long-lens photography that your project may require.

72MM FILTER THREAD: Any filters with the 72mm thread size can be screwed directly on the front of the lens, even with the lens hood attached. Despite all the image control tools currently available on modern cameras, there's still no digital replacement for a good Polarizer or UV Filter on the front of the lens when you're doing outdoor photography or fighting difficult reflections.

ELECTRONIC FOCUS RING: Like the previous models in the XL line of camcorders, the focus ring is an electronic adjustment that turns continuously. There is no definitive "start" or "stop" point. There is now an approximate "focus distance" readout in the viewfinder. Like witness marks on the barrel of a traditional photographic lens, this readout tells you roughly where the lens is focused, whether it's at 6 feet, 10 feet, etc. While the numbers are not accurate to the inch (and should not be used blindly with a measuring tape, without a good eye-focus), they are a close approximation, and can be extremely useful as a reference because they are repeatable. Thus, the camera operator can focus by eye, make a note of the distance readout, and then refocus to the same

“distance” number during multiple takes while feeling confident that the focus has landed in the same place.

ELECTRONIC ZOOM RING: Similar to the focus control, the zoom ring turns continuously and allows for quick adjustments to the focal length of the lens. While there is no readout of the exact focal length you’re using, you can now choose (on the DISPLAY page in the menu) to view your zoom position as a number from 1-99, so you know exactly where you stand. Like the focus distance mentioned above, this zoom position number is repeatable. For example, if you start a shot at “42” on the zoom scale, and then zoom in to “86” during the shot, you’ll know to re-set the lens to “42” at the start of the next take. Similarly, to duplicate the first take, you’ll know to zoom to “86” during the shot.

NEUTRAL DENSITY FILTER RING: With the push of a button and a counter-clockwise turn, you can activate either of the two neutral density filters. The 1/6 option takes down the exposure by 2 ½ stops, while the 1/32 option reduces the light intake by 5 stops. There are two primary reasons why you would want to employ these filter options: practical necessity and aesthetic choice.

Helpful Hint: Oftentimes, if you’re shooting in bright sunlit exteriors, you’ll need to engage an ND in order to get a proper exposure. The lens itself only stops down to F9.5 before closing. If this is inadequate, and the image still looks over-exposed, then the neutral density filters will bring the brightness down to a more manageable level.

OPTICAL IMAGE STABILIZER: Along with the high-quality optics and the interchangeability of the lens, this feature is the third big reason to love the Canon XL line of camcorders. While all camcorders offer some sort of image stabilization to smooth out handheld shots, the Canon system delivers a superior optical solution that does not degrade the image in any way. Unlike electronic image stabilizers that reduce jitter by digitally moving the image, the Canon lens features a gyro sensor that detects motion and continuously adjusts the vari-angle prism to eliminate jitter and shake. Super Range technology then re-examines the image after it’s been received by the CCD, and sends additional information to the vari-angle prism that further refines its movements, thereby enhancing the “smoothing” ability of the stabilizer. As a result of this advanced interactive process, your shots will be much more graceful and controlled, even when zoomed in all the way.

Helpful Hint: It is recommend that you test in your shooting situation before you keep the stabilizer turned on when using the camera on a tripod or a similarly controlled head. Under these circumstances, the stabilizer may overcompensate for the already smooth moves that you are making.

POSITION PRESET: This feature allows you to set either a focus point or a specific focal length, and then execute a “rack-focus” or a “zoom” to that pre-selected point during the shot. For example, if you want a distinct rack focus effect, you would first switch the “Position Preset” slider from “Off” to “Focus”. Then, eye-focus on whatever part of the frame you want to have in focus at the end of the shot. Slide the bar labeled

“On/Set” (beneath the “Position Preset” control) to “Set”. Now you’re ready to begin your shot. Focus on anything else in the frame that you need to, and when you want the rack-focus effect to kick in, simply slide the “On/Set” bar in the “On” direction. This can be done repeatedly over multiple takes; the “end-point” for the focus is saved until you set a new value, or until you switch the “Position Preset” bar to “Off”. You can select the speed of the rack focus (high, medium, or low) in the CAMERA SETUP page of the menu.

The same process applies for setting a zoom effect. Instead of racking focus, however, the lens will zoom to the desired focal length when the “On/Set” bar is slid in the “On” direction. You can select the speed by using the main zoom handle controls on the camera body. Set the zoom to “constant” mode and use the “fast/slow” toggle to find the desired value (from 1 to 16). Whatever speed you select in the “constant” mode will determine the speed of the “Preset” zoom effect, even if you switch the main controller to “variable”. If you keep the main control on “constant”, however, you can actually adjust the speed during the zoom by using the “fast/slow” toggle.

Helpful Hint: These presets are useful even if you’re not looking for a specific rack focus or zoom effect. If you’re doing a “talking head” interview, for example, you may want to get a solid eye-focus on your subject, and then lock that focus point into the preset. Now you’re ready for anything; if you have to pan away to grab another detail that may require a focus adjustment, you can be confident that when you return to your subject, you can hit the preset slider and return to the precise focus point without worry.

AF/MF (AUTO FOCUS/MANUAL FOCUS): You can choose Auto Focus or Manual Focus on the lens itself, regardless of which mode the camera is in. In other words, even if you’re in “Manual” mode, you can set the lens to “Auto Focus”. Similarly, even in “Auto” mode, you can set the lens to “Manual Focus”. The only exception will occur if the “Green Box” mode is selected on the camera body, in which case the lens will be placed into “Auto Focus” by default, even if “Manual” is selected.

If you are in “Manual Focus” but find yourself in a situation where you need a little help from the lens, you can use the “On/Set” slider control that is directly above the “AF/M” switch. By moving this slider to the right, you will temporarily activate the “Auto Focus” mode until the slider is released. The focus will then revert back to the “Manual” mode.

SECTION 2: THE CAMERA BODY (IMAGE CONTROLS)

RIGHT HAND GRIP: This part of the camera contains the primary zoom servo and still photo controls. As you slip your right hand up under the strap, the zoom toggle and photo capture button are both at your fingertips. The rest of the controls are on the “thumb panel”:

1. **CARD/TAPE MODE:** Selects which medium the camera is using to record a still photo. In the tape mode, the camcorder will record video onto a tape. In the card mode, the camcorder will record still images to an Memory card.

Videos and printed stills have different color requirements in order to achieve the highest quality images. Thanks to Canon's Digic DV II chip, the HL-X1 is able to switch between these separate color space demands without compromising the quality of either image.

If you are in card mode, for example, the camera will maximize the color space for a still photo that is intended for printing. In this mode, the "video" portion of the camera is turned off, and the photo is captured onto the Memory card. You will not be able to record an image to an onboard cassette when you are in card mode. Selected optional EOS flashes can also be used in this mode.

In the tape mode, you are able to capture a still photo onto the Memory card by pressing the "photo" button, but this image will be created using the video color space. Though the color space will not be adjusted for printing, the resulting image can be an excellent reference photo for a video shoot, since it will feature the exact camera point of view (instead of having a script supervisor with a separate digital camera), have the same image adjustments as the recorded video image and will contain all meta-data regarding the camera's settings.

2. **ZOOM SPEED:** The camera offers two separate choices to adjust your zoom speed. The "Variable" selection allows you to feather the zoom to your touch, while the "Constant" option allows you to select from 16 different speeds that will remain steady regardless of the amount of pressure you apply to the zoom toggle. In "Constant" mode, the speed can be adjusted on the fly by rotating the "Fast/Slow" wheel. The number of the speed you've selected is displayed in the viewfinder. (Also see the ELECTRONIC ZOOM RING section, for more details about the zoom lens.)
3. **START/STOP BUTTON:** This is the primary button for capturing a video to an onboard tape.
4. **MEMORY CARD SLOT:** Located underneath the right hand grip; can be opened by pulling down on the sliding door.

EVF FOCUS ASSIST OPTIONS: Since crisp focus is critical when recording in the HD format, these professional features have been added:

1. **PEAKING:** Enhances distinct outlines of objects in the frame. The more "in focus" the object is, the more distinct the "peaking" outline will be. This "peaking" effect is not recorded to tape, and is not output through any of the terminals.
2. **MAGNIFYING:** Electronically enlarges the frame by approximately 2x. This focus assist tool is not an "optically pure" magnification, and is not intended as an extra zoom. It cannot be recorded to tape, as the magnification turns off automatically when you press record. However, the magnification is output through the HD/SDI terminal and the HDV/DV terminal. Therefore, if you're recording out to another capture medium, be sure to turn off the magnification feature before you begin recording.

EXP. LOCK: “Exposure Lock” can be used if you’re in any mode other than “Manual”, but still want to maintain a specific exposure. This is useful, for example, if you’re in a relatively dim room with a bright window. If you don’t want the exposure to radically change as you pan across the window, use this Exposure Lock feature. Once this button is activated, you can further adjust your exposure by dialing up or down the “Iris” control, even if you’re not in “Manual” mode. In effect, when you’re in “Auto” and activate this button, it shifts the camera into “Manual” mode until you de-activate it.

LENS RELEASE: Hold this slider to the right as you twist the lens counterclockwise to release it.

IRIS/SELECT DIAL: Controls the iris when you’re in “Manual” or “Av” modes (see **POWER DIAL** section), or if you’re in “Auto” mode with the **EXP. LOCK** engaged. When navigating the menus, this same dial is used in conjunction with the “Set” button (located above it) to select and activate options.

The setting of the iris is expressed as an F-stop; a smaller number indicates a wider opening (or “aperture”), and a larger number indicates a narrow aperture. Thus, in low light situations, you will need a wider aperture in order to obtain a satisfactory exposure, probably somewhere in the neighborhood of F1.8 or F2.0. The iris itself opens to F1.6 at the widest lens, and F3.4 when zoomed into the longest lens. It closes down to F9.5 before going black. The ND filter ring built into the lens can be used in conjunction with the iris to bring bright environments into a more desirable exposure range (see the **NEUTRAL DENSITY FILTER RING** section).

“Cinematic Look” Hint: It should be noted that the iris setting is one of two primary camera factors that determine the depth of field of your image (the other factor being the focal length of the lens). When the aperture is wide open (around F2.0), you will have a much more narrow depth of field, and will notice that objects in the background and foreground tend to be much more blurry compared to whatever object you have in “crisp focus” in the frame. Conversely, an aperture that is nearly closed (such as F8, on this camera) will have a much wider depth of field; just about everything will tend to look sharp, and it will be more difficult to isolate focus on a particular object. Therefore, if you’re trying to simulate a “cinematic look”, you’re going to want to keep the iris as wide open as possible, to limit your depth of field.

SHUTTER BUTTONS: These buttons control the shutter speed. Expressed as a fraction of a second, this number tells you the actual time duration that the shutter is open each time a frame is captured, whether it’s a still photo or a frame of video. You can use this as a creative tool to achieve different effects for your production. If you want to have more “blur” in your frames, for example, then choose a longer time duration (a “slow shutter speed” such as 1/15 or 1/8). If instead you want to reduce the “blur” and make it so that even fast-moving objects appear to be “frozen” in each individual frame, then select a very small time duration (a “fast shutter speed” such as 1/500 or 1/1000, if you have enough light for it). You may also want this lack of motion-blur when photographing athletes and sporting events.

If you’re just looking to capture the type of “normal” motion that we typically associate with movies and television, then you’ll want to stay at the default shutter speeds

for each frame rate. For 60i and 30F, the default shutter speed is 1/60; for 24F, it's 1/48. If you're striving for a "cinematic look", 24F and 1/48 on the shutter control is exactly emulating the way a film camera captures motion.

Keep in mind that slower shutter speeds require less light (since the shutter is literally open for a longer period of time), and faster shutter speeds require more light (since the shutter flickers open so briefly). Thus, any shutter adjustments will require adjustments to the iris as well. You can select a shutter speed as fast as 1/15,000 with the XL H1, if you want to—but you'd better have a sunny day or a lot of lighting equipment at your disposal.

If you click down beyond 1/15,000 using the shutter speed buttons, you will arrive at "CS" mode. This "Clear Scan" feature allows you to dial out scan lines that are present when photographing a CRT television or computer monitor. These scan lines occur when the flickering frame rate of the monitor does not match the capture rate of the camera, so the CS mode allows you to match up the capture frequency of the camera to the display frequency of the monitor, so that the flickering lines virtually disappear. When you first activate the CS feature, the default frequency will be set at 60.1 Hz. To make further adjustments, go into the menu's CAMERA SETUP page and select "Clear Scan". You will now be able to use the IRIS/SELECT wheel to dial-in different frequencies until the scan lines are minimized. The total adjustment range is 60.1 to 203.9Hz in 60i mode and 50.2 to 200.3Hz in 50i mode (optional).

RECORD REVIEW: With a single press of this convenient little button, the camcorder will rewind the tape and play back the last few seconds that have been recorded. There is no need to hold the button down, as it will not increase the amount of footage that is reviewed.

BARS/FADE CONTROLS: The first of these two buttons will bring up three different options in the viewfinder: Color Bars, W. Fader, or B. Fader. The second button (labeled "On/Off") applies the effect that has been selected.

1. **COLOR BARS:** These are the standard SMPTE color bars in 60i mode commonly used to calibrate a studio monitor. If the optional 50i upgrade has been performed on the XL H1, then the color bars will be full frame in the 50i mode. We highly recommend that you have a properly-calibrated monitor for any shooting that you do, since it is the only way of knowing exactly what color and contrast your image actually contains. The color viewfinder is not a replacement for a master monitor. The color bars can be output through any of the terminals, and can also be accompanied by a 1kHz audio reference tone (at either -12dB or -20dB) if this option has been selected on the AUDIO SETUP page of the menu.
2. **W. FADER:** Once turned "on", this feature will allow you to "fade in" from white when you press the record button. Selecting the W. Fader option a second time will allow you to fade out to white at the conclusion of a recording.
3. **B. FADER:** Once turned "on", this feature will allow you to "fade in" from black when you press the record button. Selecting the B. Fader option a

second time will allow you to fade out to black at the conclusion of a recording.

MENU: Opens the main menu, which will offer slightly different options depending on whether you're in video mode, still mode, or playback mode. Please see the separate section devoted to THE MENU.

MODE SELECT: Switches the camera between High Definition (which is 16x9 by default) and Standard Definition (which can either be 16x9 or 4x3).

FRAME RATE: This switch is labeled 'i', 'F1' and 'F2'. The frame rate applied by these switches changes depending on whether the XL H1 is in 60i mode (factory standard) or 50i mode (optional upgrade). In 60i mode the frame rate switches between 60i (60 fields per second, interlaced—the “standard” video speed), 30F, and 24F. In 50i mode (optional) the choices for frame rates are: 50i, or 25F.

These Frame modes have the same look as progressive frame rates, but are not labeled “progressive” because they are created with an interlaced chip. The end result is exactly the same to the editing system (and to our eyes) as 30p and 24p, respectively.

Note: The actual frame rates are 59.94, 29.97 and 23.976 for 60i mode and 50 and 25 for 50i mode (optional).

END SEARCH: Reviews the footage on the onboard tape and finds the very end of the recording, then enters the “Record Pause” mode so that you will not lose any footage, and assures that there will be no time code break.

GAIN CONTROL: Allows you to electronically enhance the XL H1's ability to see in low light. Of course, as with all cameras, the higher the “Gain” number, the more noise and “graininess” you're going to add into the mix. The Gain function on the XL H1 is particularly good, and you can usually go up to about +6dB of Gain without adding too much noise. If you need to go higher, then “Noise Reduction 1” (in CUSTOM PRESETS) is an excellent solution.

Placing the Gain control on “A” will allow the camera to automatically manipulate the Gain so that you have consistent signal strength. This means that you could potentially see a change in ‘graininess’ as you move through darker areas, as the camera electronically enhances the image. It is usually a good idea to set the Gain at whatever specific level you feel necessary, so that it does not vary during the shot.

WHITE BALANCE: This is the process by which you teach the camera what “white light” is, every time you move to a different shooting environment. All light sources have different color temperatures associated with them, which manifest as different colors of light. The human brain automatically “white balances” for us, so these color differences are not always apparent. To a camcorder, however, a tungsten lightbulb will appear much more orange than sunlight, which appears comparatively blue. If you want these sources to appear as “white”, you have to setup the white balance of the camera.

To manually white balance the camera, point at something white (a card or piece of paper; sometimes even a T-shirt), and hold down the “white balance” icon button until

the matching symbol in the viewfinder stops blinking. You can also use the default “sunlight” or “light bulb” settings, if you know you’re going to be shooting primarily with those types of light sources, although you can always customize the white balance yourself.

The control knob on the XL H1 offers all the typical “White Balance” options, including 2 separate programmable pre-sets, which are great to have on hand if you find yourself going back and forth between two locations, and don’t want to reprogram your white balance each time you re-enter the same space.

There is also a new “Degrees Kelvin” feature. If you select this “K” option, you can actually dial-in the specific numeric value of your white balance, from 2800 to 12,000 degrees Kelvin in 100 degree increments. This is a crucial tool if, for example, you want a sunset scene to have a nice warm quality to it. If you simply white balance the scene, then the light you’re shooting in will become white, and you’ll be taking out all the dusky quality that you want to keep. In the past, camera operators would have to “fool” the camera by white balancing through a blue colored gel, or against a blue card (so that the camera would compensate by dialing in more “orange”). Now, with the “K” option, you can dial whatever amount of warmth or coolness you want.

STANDBY: Holding down this button for a few seconds allows the camera to power down into a “Standby” mode that can help conserve battery life, if you know you won’t be shooting for the next few minutes. Another push of the button will “wake the camera up” so that it’s ready to shoot, with all of your settings intact.

AE SHIFT: This wheel gives you some control over the camera’s Auto Exposure decisions, and is active when you’re in any camera mode other than “Manual”. The “AE Shift” allows you to adjust the way the camera is metering a scene. For example, if you’re in the “Auto” mode and want the camera to continue exposing for you, but you know that you want everything to be generally darker and more moody than the camera is making it, dial the “AE Shift” into the negative numbers. To make things uniformly brighter than the camera is choosing, turn the “AE Shift” into the positive numbers.

EVF DISPLAY: This button allows you to hide some or all of the text information displayed in the electronic viewfinder. Press the button multiple times to view all the options. One option is completely clear – with no overlays mimicking an optical viewfinder.

CUSTOM KEYS: These are two buttons that you can customize for your own convenience. Use them to program menu items that you use frequently, so that you have instant access to them. For example, if you’re a professional who uses the Zebra feature, you may want to program the Zebra “on/off” into one of these custom buttons so that you don’t have to fish through the menu every time you want to activate it. You can program the custom keys by going into the SYSTEM page of the menu.

CUSTOM PRESET: With these two topside buttons, you can select and activate any of the 6 onboard custom presets, or you can turn off the presets altogether and revert to the camera’s “out of the box” mode. The presets themselves allow you to customize every

aspect of the image, from complex color manipulation to shadow detail, and are programmed or imported within the menu (on the CUSTOM PRESET page). This complete image control is one of the many reasons why the XL H1 is such a great creative tool.

Once you have programmed any or all of the 6 onboard presets, use the right-hand “Select” button to toggle through each of them, and use the left-hand “On/Off” button to activate or de-activate the one you’ve chosen. It’s that simple. For more information on the presets and the specific creative options they present, please see the “CUSTOM PRESETS” section within the MENU.

LIGHT: Illuminates the side panel display for 10 seconds. If you want the backlight to remain on, hold this button down for about 3 seconds. Press the button again when you want to turn it off.

POWER DIAL: Rotates through all the different camera-modes, including playback and external control, and will also turn the camera off. Use the small gray release button located below the “green box” to unlock the dial.

1. **EXT CONT:** This mode allows you to manipulate the camera functions from the Canon Console software, which can be hooked up to the XL H1 via IEEE 1394.
2. **VCR/PLAY:** Allows you to playback and review any video footage or stills you’ve captured, depending on whether you’re in tape mode or card mode. Use the VCR control buttons on the top handle to navigate through the images.
3. **AUTO:** In this mode, most of the controls will be automatic, although you still have the option of making manual adjustments. The FOCUS, WHITE BALANCE, and GAIN functions, however, will still be controlled by their individual switches/dials, and will not be “automatic” unless you select the auto setting on each. The camera will automatically control exposure, but you can make adjustments by using the EXP. LOCK button along with the IRIS dial, or by changing the AE SHIFT wheel.
4. **Tv:** This “Shutter Priority” mode allows you to select whatever shutter speed you’d like to use. The camcorder will then make exposure adjustments by manipulating the iris, while maintaining your selected shutter speed.
5. **Av:** This “Aperture Priority” mode allows you to select whatever aperture setting (F-stop) you’d like to use. The camcorder will then make exposure adjustments by manipulating the shutter, while maintaining your selected F-stop.
6. **M:** The “Manual” mode is for full manual control, and allows you to manipulate every aspect of the camera’s function. Even in this mode, you can still choose the “Auto” settings for FOCUS, WHITE BALANCE, and GAIN by using their individual switches/dials.
7. **SPOTLIGHT:** This “Auto Exposure” mode is maximized for lighting situations where subjects are illuminated by a spotlight or other concentrated light source. This is perfect for filming speeches, where the speaker is illuminated and the background is not lit.

8. **NIGHT:** This “Auto Exposure” mode is maximized to record subjects in very low light levels, primarily by using slower shutter speeds. This may cause trailing afterimages and motion blur that may be undesirable. You may choose to manipulate focus manually.
9. **GREEN BOX:** This mode renders every aspect of the camera “automatic”. Even the individual “Auto/Manual” controls for FOCUS, GAIN, and WHITE BALANCE are over-ridden. Similarly, the EXP. LOCK and AE SHIFT controls will have no effect. This mode turns over all decisions regarding the image to the camcorder. This mode is great for immediate shooting after power-up.

TOP HANDLE CONTROLS: This portion of the camera contains the secondary “Start/Stop” buttons for capturing video or stills, as well as a secondary zoom toggle. The placement of these buttons is particularly convenient if you’re doing low-angle shots that require you to hold the camera down near ground level.

To adjust the speed of the topside zoom toggle, switch the primary zoom controller to “Constant” (on the right-hand grip), and manipulate the “Fast/Slow” dial to choose which of the 16 speeds you want to apply. This can be adjusted “on the fly” during the shot. The “Variable” option does not apply to this secondary controller, only the constant speeds.

If you’re afraid you might accidentally bump one of these buttons during a take, you can disable them by sliding the “lock” on the right-hand side of the handle.

ADVANCED ACCESSORY SHOE: This “hot shoe” can be used to power a small camera light, or to hook up the Canon MA-300, which will allow the input of two additional XLR audio channels.

VCR/STILL PHOTO REVIEW CONTROLS: Under the flip-up door on the top of the handle, you will find all the standard VCR buttons that you can use to review your video footage. These same buttons are used in “Card” mode to review your still images. In this case, the function of each button is labeled on the flip-up door.

SECTION 3: THE CAMERA BODY (AUDIO CONTROLS)

Most of the primary audio options are contained near the rear of the camera body in the flip-open “Audio Control Panel”. Please note, however, that there are some important options located on the AUDIO SETUP page of the menu, which will be discussed later.

One item that should be talked about before the audio controls is the included microphone. The microphone is an electret stereo condenser type with a directivity of 120 degrees. It is also capable of mono recording with a uni-directional pick-up pattern.

AUDIO 1: This lower half of the flip-open “Audio Control Panel” controls whichever audio source is being sent to Channels 1 and 2, regardless of whether you’re recording 2-

channel audio or 4-channel audio (selected in the menu on the AUDIO SETUP page). If you are recording 2-channel audio, you will not have to use the upper “Audio 2” controls at all.

INPUT SELECT: Use this switch to determine your audio source.

1. **FRONT MIC:** Refers to the onboard mic that is mounted on the camera. Attached to this option is a “FRONT MIC ATT” switch. If your audio levels are too “hot” to work with, this attenuator will knock down the signal by 20dB.
2. **AUDIO 1:** Should be selected if your sound is being input via the bottom two RCA ports that are located on the opposite side of the camera.
3. **REAR:** Refers to any sound signals coming into the camera via the professional XLR jacks located in the rear of the camera. Attached to this option is a “REC CH SELECT” switch. Since two XLR jacks are onboard the camera, this will assign where each of the signals is going. If you have only one input into the XLR jack labeled “CH 1/3” and you want to send its mono signal to both channels, then you should select CH1-CH 2”. If you have sound sources plugged into both XLR inputs, however, then the selector should be set for “CH 1”. This will allow the left-hand XLR to feed into channel 1, while the right-hand XLR input will be assigned to channel 2.

REC LEVEL: Select Auto or Manual Record Level. For most sit-down interviews, you’ll probably be able to set a good level manually, since the subject’s voice will generally remain consistent. If you’re in a more chaotic situation, you’ll probably be focused on too many other camera functions to ride the audio levels. In this case, the Auto option may be more desirable.

CH 1/CH 2 DIALS: When you’re in the “Manual Record Level” mode, these are the controls you will need to dial in your desired audio levels. Use these dials in conjunction with the audio meters located on the side display of the camera, or within the viewfinder. In general, you should be working in the center range of the dials (where the audio processors are maximized for the best quality sound), and should not have to be set at a level near “MIN” or “MAX”. If you find that your levels are too hot, you can engage an attenuator that will knock down the levels by 20dB. There is an attenuator switch for the Front Mic located above the Channel 2 dial. The attenuators for the rear XLR inputs are located directly above those inputs. If you’re using the rear XLR inputs and the sound levels are too low, use the R-XLR GAINUP option in the Menu (on the AUDIO SETUP page) to boost your signal by 12dB.

AUDIO 2: These options will control whichever audio source is being sent to Channels 3 and 4, if you are recording 4-channel audio (selected in the menu on the AUDIO SETUP page). You will still need to use the “Audio 1” options to control Channels 1 and 2. In HDV, however, you can record 4-channel sound at 16-bit, since this format uses MPEG audio compression. The only difference between 2-channel and 4-channel sound recording in HDV is that the audio recording system changes from MPEG1 to MPEG2.

Please note that, in order to record 4-channel audio in SD (Standard Definition) mode, you will have to drop from 16-bit audio to 12-bit, and will definitely notice the quality difference.

INPUT SELECT: Use this switch to determine your audio source for Channels 3 and 4. Just about any combination is possible when used in conjunction with the “Input Select” for Channels 1 and 2.

1. **SHOE:** Selects an audio signal coming into the camera via the Accessory Shoe (located on the very top of the handle). Attaching the Canon MA-300, for example, will allow you to input audio through two additional XLR terminals.
2. **AUDIO 2:** Should be selected if your sound is being input via the top two RCA ports that are located on the opposite side of the camera.
3. **REAR:** Refers to any sound signals coming into the camera via the professional XLR jacks located in the rear of the camera. For 4-Channel audio, these jacks can be used to input sound to Channels 3 and 4 while using the lower “Audio 1” panel to select another source (such as the “Front Mic” or RCA terminals) to send audio to Channels 1 and 2.

REC LEVEL: Select Auto or Manual Record Level. For most sit-down interviews, you’ll probably be able to set a good level manually, since the subject’s voice will generally remain consistent. If you’re in a more chaotic situation, you’ll probably be focused on too many other camera functions to ride the audio levels. In this case, the Auto option may be more desirable.

CH 3/CH 4 DIALS: When you’re in the “Manual Record Level” mode, these are the controls you will need to dial in your desired audio levels for channels 3 and 4. Use these dials in conjunction with the audio meters located on the side display of the camera, or within the viewfinder. In general, you should be working in the center range of the dials (where the audio processors are maximized for the best quality sound), and should not have to be set at a level near “MIN” or “MAX”. If you’re using the rear XLR inputs and find that your levels are too hot, you can kick in the attenuator located directly above those inputs. If the sound levels from these XLR inputs are too low, use the R-XLR GAINUP option in the Menu (on the AUDIO SETUP page) to boost your signal by 12dB.

AUDIO MONITOR BUTTON (located next to the main POWER DIAL): When recording 4-channel audio, this button will control which signals the audio level indicators are monitoring. With each press of the button, you can monitor channels 1/2, channels 3/4, or a mix of channels 1/2 and 3/4.

REAR AUDIO CONTROLS: These options are all located at the base of the main handle of the camera, just above the balanced XLR inputs.

1. **PHONES LEVEL/PHONES JACK:** Plug in headphones to monitor your sound, and adjust volume using the “Level” control. The volume dial will not affect the recording level of your audio.

2. **LINE/MIC:** Tells the camera which type of signal you're sending in through the professional XLR inputs. If your signal is coming directly from a mic (whether via wireless receiver or cable), then you should select "Mic". If your audio is going through a mixer or coming from another source, you should select "Line".
3. **+48V SWITCH:** Sends phantom power to those microphones that require it. Keep this switch in the "off" position until you actually need it to power a mic, since you could damage equipment that does not require it.
4. **MIC ATT:** If your audio levels are too "hot" to work with, this attenuator will knock down the signal by 20dB. It's always best to use the middle range of your "Level" dials, since this is where the audio processors are maximized to deliver the best audio. If you find yourself dialed up to the "Max" end of the scale, activate the attenuator to knock the signal back down to a more manageable level.

SECTION 4: INPUT AND OUTPUT JACKS

Aside from providing the user with complete control over the image, the Canon XL H1 also provides complete creative freedom when it comes to inputs and outputs. In a professional shooting environment, whether it's a multi-camera broadcast situation, a feature film, or a run-and-gun documentary, this camera delivers all the options needed to flow seamlessly with existing workflows and expectations.

THE PROFESSIONAL JACKPACK: This is the series of four terminals located in the rear of the camera, on the shoulder pad. These four inputs set the XL H1 apart from any other comparable camera, and place the XL H1 in a class of its own.

1. **TC-IN/TC-OUT:** Can receive or send out the SMPTE-standard LTC timing signal. This means that you can share time code with an external device (such as a DAT recorder for dual-system sound) or from camera to camera.

For "Time Code In", simply connect the device generating the desired time code and allow the synchronization to stabilize. This usually takes about 10 seconds. Once this is done, the cable connecting the two devices can be removed and the time code synch will be maintained as long as the camera is not turned "Off" or switched into "VCR/Play" mode. The synch will also be lost if you change the FRAME RATE. In SD mode ("Standard Definition") at 24F, you will not be able to import time code at all.

For "Time Code Out", you must go into the menu and activate the T. CODE OUT option on the SIGNAL SETUP page. Then, you can hook up another device to receive the time code that is being generated by the camera (or that has been imported from yet another device in the chain).

When sharing time code, only the FREE RUN mode will be useful; it is the only mode that runs continuously, regardless of whether or not the operator has pressed "Record". This FREE RUN option is found in the menu, within the TIMECODE sub-heading on the CAMERA SETUP page.

Note: No matter what frame rates that the XL H1 is set to, in 60i mode the Time Code signals are always 29.97DF and in 50i mode (optional) is always 25.

2. **GENLOCK:** Short for “Generator Lock”, Genlock is a signal sent from an external source (such as a sync generator, switcher or other camera) that ensures the seamless interaction between images by making sure that the different video signals are all being “generated” with the same timing, in sync with one another. This is an absolute must in a “live” broadcast environment, for example, when images must be edited on the fly without visibly “jumping”.

Each video signal has its own vertical and horizontal phase values (its own unique “timing”, when the scan-lines are actually being “drawn” across the screen). The Genlock reference can be as simple as another video signal, which will “teach” its timing to the new signal and thus synchronize the two so that the video images are being drawn exactly in unison. Thus, there will be no “bump” or “stutter” during transitions when intercutting or overlapping images from multiple camera sources.

Activate this feature by going into the EXT. SYNC option on the SIGNAL SETUP page of the menu. Select either “Genlock” or “Genlock + TC”, depending on your specific input situation. Use the GENLCK ADJST option (on the same menu page) to match the phase of your reference signal. .

3. **HD/SD SDI:** The Serial Digital Interface (SDI) terminal of the XL H1 is able to deliver full resolution uncompressed HD/SD SDI at a 4:2:2 color space.

This terminal is also capable of transmitting the lower bit-rate SD signal from the camera even when the XL H1 is set for HD or recording HD to tape.

What’s more, since the signal is transmitted via coaxial cable, you can run 100 meters without worrying about any lost data, which is ideal for situations when the camera may be up in a crane, or traveling during a long walk around shot.

When using the SDI terminal to output a signal, make sure that the SDI OUTPUT is set to “On” in the SIGNAL SETUP page of the menu. Also, when outputting the HD signal, set the SDI SPEC to “Auto”.

COMPONENT OUT: Located in the very rear of the camera (beneath the XLR inputs), this terminal separately transmits the three component video signals to your destination deck or monitor, to ensure the highest possible color and luminance fidelity. On the SIGNAL SETUP page of the menu, the COMP OUT option allows you to select whether you want to output at 480i or 1080i/480i. If you’re outputting an HD signal to a standard definition monitor, for example, you will need to select 480i in order to make the down-conversion.

XLR (CH 1/3, CH 2/4): The professional standard for audio input. The Canon XL H1 offers two balanced XLR terminals built into the camera, with the option of adding two additional XLR inputs by using the MA-300 adaptor, which can be attached via the “Advanced Accessory Shoe” on top of the handle. Please see the section regarding CAMERA BODY (AUDIO CONTROLS) for more information about the XL H1’s

sound-recording capabilities and for a description of the audio options located directly above the XLR jacks.

IEEE1394: Standard IEEE1394 digital input/output that accepts a 4-pin connector cable. This terminal can be used to transport HD or SD digital video as well as control signals to and from the XL H1, and is used most frequently either for capture onto a portable hard-drive or laptop, or for ingesting your footage from an onboard tape transport into your editing system. This terminal is also used to control the XL H1 from Canon's Console Image Control and Storage Software.

For tape playback (when the camera is in VCR/PLAY mode), there is an "HD DOWN-CONV" option on the SIGNAL SETUP page of the menu, in case you want to output a tape recorded in HD to SD.

THE ANALOG COMPARTMENT: To the left of the battery is a compartment that contains all the standard analog inputs/outputs for sound and picture, including S-Video, BNC, and RCA terminals. All of these video ports will transmit a down-converted signal when the camera is in HD mode, and all signals originating in 16x9 (whether SD or HD) will appear "squeezed" on a 4x3 monitor. The audio RCA jacks allow input/output for up to four channels of audio.

ONBOARD VIDEO RECORDING: The onboard deck takes a HDV cassette, onto which you can record in HDV HD format or standard definition (4x3 or 16x9). When recording SD (Standard Definition) you can use a miniDV cassette.

THE MEMORY CARD: Below the right-hand zoom handle is the small cover for the memory card. This card can be used to capture stills and to record the meta-data that contains all the camera settings. Photos taken with the XL H1 will always be sent to the Memory card, even if the camera is set to "video mode", but the color space of the photos will change depending on whether the photo mode is set for video or card. When shooting in "video mode" the photo, along with the time code and the metadata of the image set-up is also saved. Additionally, the MEMORY card can store up to 20 "Custom Presets", and will allow you to share presets between multiple cameras.

SECTION 5: THE MENU

The heart of the XL H1 is its extensive menu system, which offers a wide array of professional features. Whether you're turning off the tally lamp or getting into the "Custom Presets" and controlling every aspect of your image, the step-by-step menus make every aspect of camera operation easy and straightforward.

SIGNAL SETUP: This menu page features all the options involving reference signals coming in or out of the camera, as well as choices having to do with what type of resolution is exported via the camera's video outputs. If you pay for the upgrade to make

your XL H1 into an NTSC/PAL switch-able camera, that option will be added to this menu page as well.

1. TIME CODE: Select type of time code and set the numerical start-point.
 - a. FRAME SETTING: Choose between “Drop” and “Non-Drop” code. These are simply two different ways to count the video frames you are capturing; no frame of information is ever actually “dropped” if you choose the “Drop” setting.

“Drop Frame” is the more “time-accurate” method of time code, since it reflects the actual run-time of your program. The reason for this becomes clear when we remember that what we commonly call 30 frames per second, for example, is actually 29.97 frames. This adds up to a 54-frame discrepancy over the course of a 30-minute program. In other words, what “Non-Drop” code would measure to be a 30-minute running length would in fact clock in at 29.97 minutes.

“Drop Frame” accounts for this and simply “skips” numbers periodically to keep the running time code in line with actual elapsed time. Once again, to make it perfectly clear, no frame of information is ever lost during this process; it’s simply a different method of counting. Because of its increased time accuracy, all networks and cable companies require delivery using “Drop Frame” mode. In general, “Non-Drop” is only used when editing a film project that will be output to celluloid. When in doubt, talk to your editor to make sure you’re both on the same page.
 - b. COUNT-UP: Select the “run mode” of your time code. In “Rec-Run”, the time code will only advance when you are recording. “Rec-Run PS” is the same mode, but you can select the exact starting value of the time code, down to the frame.

“Free Run” will start at the value you select and will then run continuously until deactivated, even if you turn the camera off, and even if you disconnect the battery pack (provided the built-in lithium battery has sufficient charge). This will be the most useful mode for syncing multiple cameras to the same time code, since the code will continue to advance regardless of whether the individual camera operators are on “record” or “pause”. Also, since you can select the start-point of the “Free Run”, you can choose for this to reflect time of day. Please note that “Free Run” is not available when shooting standard definition video mode at 24F.
 - c. START VALUE: This option will only be activated if you have selected “Rec-Run PS” or “Free Run”. When you choose either of these run modes, the menu will walk you through the process of setting your time code’s starting value, which will be displayed here. You can change the “Start Value” at any time by clicking on this display. You can also make this start value reflect time of day.
2. EXT. SYNC: This menu item refers to the Genlock input only. Select whether or not you want the camera to read Genlock only, or grab time code imbedded in the reference signal. If you’re simply importing time code

through the “Time Code In” terminal, then you don’t have to worry about making a selection here.

Note: Regardless of frame rate, the Time Code signal in 60i mode is 29.97DF, in 50i mode it is 25.

3. GENLCK ADJST: Once you have a Genlock reference signal coming into the camera, you can be assured that your image will be in vertical and horizontal sync with whatever other sources you have hooked into your Genlock system. However, the color (determined by a subcarrier wave at the beginning of each scan line) may still be out of phase. This problem will manifest as a continuous color shift through the rainbow spectrum. You can adjust the phase with this menu option until the signals appear to match and the color shift disappears.

Note: The adjustment range is: HD -13.8 μ S to +13.8 μ in 13.5ns units/ -0.46 H to +45 H; SD -27.6 μ to +27.6 μ in 27ns units/ -0.43 H to +0.43H

4. T. CODE OUT: Turn this “On” if you want to send time code out through the TC OUT port on the side of the camera. Time code is sent as a standard LTC timing signal.

Note: Regardless of frame rate, the Time Code signal in 60i mode is 29.97DF, in 50i mode it is 25.

5. COMP. OUT: Determines the resolution of the signal being sent out through the component terminal at the rear of the camera. “1080i/480i” will send out the signal at its native resolution, whether it’s high definition or standard definition. “480i” mode, however, will only send out a standard definition signal. If the camera is in HD mode, the signal will be down-converted to SD and will appear “squeezed” when received by a 4x3 monitor.
6. SDI OUTPUT: Turns “On” or “Off” the SDI port on the side of the camera.
Note: Regardless of frame rate, the SDI output in 60i mode is 59.94, in 50i mode it is 50.
7. SDI SPEC: Determines the resolution of the signal being sent out through the SDI terminal on the side of the camera. “Auto” will send the signal at its native resolution, whether it’s standard definition or uncompressed HD. “SD LOCKED”, however, will only send out a standard definition signal. If the camera is in HD mode, the signal will be down-converted to SD and will appear “squeezed” when received by a 4x3 monitor.
8. If the optional upgrade to 60i/50i has been performed, then there will be a 50/60 SEL option in the EVF. This menu item allows you to set the XL H1 for either 60i or 50i recording.

CAMERA SETUP: This menu page offers control over several setup features of the XL H1.

1. ZEBRA/ZEBRA LEVEL: These two features allow you to turn on and off the zebra pattern, and adjust the “Zebra Level” from 70% to 100% (in increments of 5). The zebra pattern indicates areas of the frame that may be approaching over-exposure.

“100%” represents the level at which the video signal can no longer handle over-exposure, and will contain no detail. Camera operators typically

set the zebra pattern at some level below 100% to alert them to an overexposed area before detail is lost. Once a portion of the frame has “clipped” over 100%, no amount of manipulation in post-production will bring back detail to that area. However, don’t be afraid of the pattern; just be aware of where it’s showing up. Even a properly exposed frame will most likely have some “zebra” in it, whether it’s flickering across a midday sky or across light sources in a dim room.

Used wisely, the zebra can be your guide to perfect exposure, so set the level that works best for you. Since the 70% setting roughly approximates the luminance of properly exposed Caucasian skin, some operators like to use this level as a reference. Others set it at 90% as a warning that “there’s still detail contained here, but it’s getting hot”.

2. **SKIN D. SET:** This feature allows you to soften a specifically selected area of the frame. In particular, this comes in handy when you want to “soften” someone’s skin while leaving the rest of the frame sharp. By clicking this menu item, you can access all the different parameters needed to “zero in” on just the right area of the frame you want to soften.

“Hue” allows you to select whether the skin tone is reddish or greenish in color. “Chroma” adjusts the detection depending on whether the skin is colorful or pale. “Area” expands or lessens the color range of the detection, while “Y Level” (Luminance) allows you to select whether the skin tone is brighter or darker.

By manipulating these controls, you can pretty well isolate whatever skin-tone you’re shooting. The selected area is clearly displayed by a flashing zebra pattern. Finally, you can use the SKIN DETAIL control to turn the feature “On” and to choose different degrees of softening: high, middle, or low. A “face” icon will appear in the viewfinder when this feature is active.

3. **F. SPEED PSET:** Select the speed of the “rack focus” feature that is available on the 20x Zoom Lens that comes standard with the camera. For a full description of this feature, please see POSITION PRESET under the section about THE LENS. You can select “Low”, “Medium”, or “High” speed, and this setting applies only to the Focus Preset (the speed of the Zoom Preset is determined by the dial on the right-hand zoom control).
4. **CLEAR SCAN:** Activate this menu item by using the shutter buttons on the camera body, and by clicking through the faster shutter speeds until you reach CS mode. Once the camera is in this mode, the CLEAR SCAN menu item will allow you to dial different frequencies. Most commonly, this is used to eliminate a flickering roll-bar on a monitor that is in your frame. For further information, please see the description of the SHUTTER in the CAMERA BODY (IMAGE CONTROLS) section.
5. **FB:** This “Flange-Back” option allows you to calibrate the optics of your lens manually or automatically, to ensure that you are perfectly “in focus” along the entire zoom range of the lens. Now that this has become a separate feature, apart from the normal operation of the electronic focus control, the XL H1’s HD lens operates without any drift in focus, no matter how many times you zoom in and out during a shot.

To set the Flange Back effectively, you should ideally have a professional focus chart placed at least 5 ft from the camera. If you don't have the chart, place some item with clearly definable lines (something easy to focus on) at a comparable distance. Secure the camera onto a tripod or other immovable mount and frame the subject so that it will be in the center of the frame whether you zoom all the way in or out.

Next, find a decent exposure on your subject while making sure that you are "wide open" on the iris, in order to see critical focus. You can do this in MANUAL mode by using the built-in ND filters or manipulating the shutter speed so that the iris can remain wide open. You can also place the camera in Av mode and select the smallest iris number; the camera will make the necessary adjustments to achieve a decent exposure.

Now you are ready to start the Flange Back adjustment. Please note that the feature is only active when you are in 30F or 60i modes, although the result will still apply to all frame rates, including 24F.

- a. AF ADJUST: Automatically takes over and adjusts Flange Back by zooming in on the subject, focusing, zooming out and re-focusing. The display will indicate when the adjustment is completed.
- b. MF ADJUST: The display walks you through the following process. First, the camcorder automatically zooms in to full telephoto. Manually focus so that the subject is as sharp as possible. Press the SET button. Now, the camcorder zooms out to the widest focal length. Re-focus so that the subject is once again as sharp as possible. It's always recommended that you throw the subject radically out of focus first so that you have some relativity that will help find the sharpest focus. Press the SET button. The display will indicate that the adjustment is complete.
- c. SET DEFAULT: Resets the stored Flange Back adjustment for the lens.

CUSTOM PRESET: This menu page is the key that unlocks the full creative potential of the XL H1, delivering complete image control into the hands of the camera operator. Each adjustment is individual; you literally have billions of custom "looks" that can be setup in the XL H1.

You can program up to 6 different "looks" on-board the camera, which can be accessed easily with the two "Custom Preset" buttons on the camera body. You can store an additional 20 settings on a memory card. The memory cards also enable you to share Custom Presets between multiple cameras: simply save the setting, transfer the Memory card to another XL H1, and download using this same menu page.

The value of this ability to store so many different visual styles cannot be overstated. Just as you might need to store multiple "White Balance" settings if you're going in and out of the same locations, you can now have multiple "style" settings that you can access depending on what part of the story you're telling. For example, you can have a "cooler", more de-saturated setting when the lead character has reached his/her emotional low point, or a vivid, colorful setting when the character is succeeding; maybe a greenish, sickly tone for when the world seems more threatening, or an idyllic sepia

wash when depicting a more nostalgic time. Visual style tells the story just as much as any dialogue or action the hero may perform. In a perfect world, the visuals should reflect the plight of the hero, and should undergo a “character arc” of their own.

Since projects are not typically shot “in sequence”, you will frequently have to shoot a “good times” scene followed by a “down in the dumps” scene, followed by a “scary/dangerous” scene, then back to the “good times” again. With the XL H1, the easy recall of each distinctive, pre-programmed “look” ensures that you’re always ready for the next scene, even if it’s a radical emotional departure from the previous shot.

Once you select the CUSTOM PRESET option on the main menu, you will bring up a “matrix” page that is divided into three sections: a vertical bar down the left-hand side, a horizontal bar along the bottom, and the matrix itself (with all the image control options). The whole thing becomes less intimidating when you realize that this is the order in which you will be navigating your way through the three separate portions of this menu page.

1. **THE VERTICAL MENU BAR:** Allows you to select whether you’re working with the 6 on-board presets, exporting a preset to an Memory card, or importing one. It also features the “arrow” option, which returns you to the main menu. Once you make a selection, you then jump down to the horizontal menu across the bottom of the page.
2. **THE HORIZONTAL MENU BAR:** Offers specific control over the source of the preset you’ve chosen. There is one set of options if you’ve chosen to look at the “onboard presets”, and another set if you’ve chosen to export or import. In the case of exporting or importing, these options are fairly self-explanatory as they walk you through the process. We will therefore continue to discuss the 6 onboard presets. Once you have selected the “onboard presets” icon in the vertical menu on the left-hand side, you will have six new icons to scroll through on the horizontal menu.
 - a. **SELECT CP:** Allows you to toggle through the 6 different presets (which will be displayed at the very top of the page) and select which one you want to adjust. Once you have made a selection, press the SET button and move along to the next icon on the bottom menu.
 - b. **TUNE:** Allows you access to the large matrix of image control options. These will be discussed in depth below. Once you have fine-tuned your image using all of these parameters, the “RETURN” arrow icon (at the end of the list) will land you back in the horizontal menu.
 - c. **RENAME:** You can go one-by-one through the eight characters of the name (displayed at the top of the page) and give it any label you wish, using any combination of numbers and letters. For example, you may wish to identify your different visual styles according to the emotion that they convey: “happy”, “sad1”, “sad2”, “scary”, etc.
 - d. **PROTECT:** Allows you to “lock” the Custom Preset so that it is not inadvertently altered. You will have to use the same icon to “unlock” the preset if you want to get into the matrix and change something.
 - e. **RESET:** Returns all of the image control parameters to the default “out of the box” settings.

- f. RETURN: Places you back into the “vertical menu bar” on the left-hand side.
3. THE IMAGE CONTROL MATRIX: This is the “meat” of the CUSTOM PRESET menu page. You can scroll one-by-one through each parameter that will determine the “look” of your visual image. It is highly recommended that you hook the camera up to a properly calibrated studio monitor in order to see what colors and contrast levels you are actually achieving. It can be very difficult to accurately judge such things on the small electronic viewfinder, and you may be surprised by what you end up with.

- a. GAMMA: Selects the shape of the Gamma Curve, which determines the luminance range of your image. Every film stock and every video format has its own unique Gamma Curve. Simply put, it’s a graphic representation of how the capture medium will handle the light.

You can clearly see the differences between the three Gamma Curve options if you’re able to hook the camera up to a Waveform Monitor (such as the one included with the Canon Console software). The Cinema Gamma Curves appear to be more “squashed” than the relatively wider “Normal” video curve. This means that, with the two Cinema curves, more picture information is actually being captured between the 0% black level and the 100% overexposure level, which are the two extreme points above and below which no picture information can be captured. Since the two Cinema curves squeeze more information between these two extreme points, they offer greater latitude than the Normal curve, and will feature more detail in the highlights and shadow areas. In practical terms, this makes the Cinema Curves “richer” and more film-like.

The “Cinema 2” curve was specifically designed with an eventual film output in mind. Its particular latitude should provide the most faithful translation to celluloid, though it makes for a “darker” image on video. In general, if your image is going to remain in the digital realm but you want the richer look of film, the “Cinema 1” curve is probably the best choice.

Note: You can use the other controls to customize the preset gamma curves

- b. KNEE: Raises or lowers the top of the Gamma Curve (otherwise known as the “knee”), giving you either greater or less detail in the highlights. For example, the “low” setting will bring down the very top “roll off” portion of the Gamma Curve, lowering some of the overexposed details back into range. The “high” setting, on the other hand, may push more details over the 100% overexposure level.
- c. BLACK: Raises or lowers the bottom portion of the Gamma Curve (otherwise known as the “toe”), giving you either greater or less detail in the shadow areas. For example, the “stretch” setting will bring up the lower “roll off” portion of the Gamma Curve, raising some of the underexposed details back into range. The “press” setting may push more details into black.

- d. **MASTER PEDESTAL:** Raises and lowers only the bottom portion of the Gamma Curve, thus changing the actual shape of the curve. Lowering the Master Pedestal can give a little more richness to the overall image, while raising it will allow more detail in the shadows, but may tend to “wash out” the image. Unlike the Setup Level (see below), manipulation of the Master Pedestal will not affect the brighter objects in the frame (the upper portion of the Gamma Curve).

The Master Pedestal is helpful when used (carefully) in tandem with the Setup Level. For example, adjusting the shape of the Gamma Curve with the Master Pedestal determines how much latitude you can capture between full white and full black. You can then use the Setup Level to move that newly shaped curve “up or down” to achieve just the look you need. When you use these two options together, along with the KNEE and BLACK settings, you’re effectively creating your own film stock.

- e. **SETUP LEVEL:** Basically raises and lowers the Gamma Curve while maintaining the same “shape”. A lower setup level can help the image look a little more “rich”, as long as you’re not in danger of crushing the shadow detail below broadcast standards. Higher setup levels will bring more detail into the shadows, but may also “wash out” the image. Be careful not to shift the curve so far that you cannot deliver a product that is considered “broadcast safe” under NTSC guidelines. It is highly recommended that you use a Waveform Monitor (such as the one included with the Canon Console software) when making adjustments to the Setup Level and the Master Pedestal, so you’ll know where your levels are falling.
- f. **SHARPNESS:** Increases or decreases the overall sharpness. A slightly softer look might be a bit more flattering for your actors, or appear to be a little more “film-like”. Reduced sharpness can even help hide the presence of grain in a situation where you may have had to turn on the “Gain” function. A little more sharpness, on the other hand, may be required to make those spectacular nature shots leap off the screen.
- g. **H DTL FREQ and DTL H/V BAL:** These controls adjust the center frequency of the H detail and the horizontal/vertical percentage of detail correction.
- h. **CORING:** Can be helpful in adjusting the subtle noise components of the image.
- i. **NOISE REDUCTION 1:** This is a highly effective function of the XL H1’s new generation of Digic DV II chips, and is a much more useful tool than previous generations of noise reduction. The “low” setting will dial out a good deal of graininess without adding any unwanted artifacts to the image. The “high” setting, however, should be used with care on moving images, because it can add a trailing after-image.
- j. **NOISE REDUCTION 2:** This option was primarily designed to dial out the kind of noise you might find in “flat” colors or surfaces, such as a solid blue sky. It should be used in very specific circumstances,

however, as it can tend to soften the whole image. Even the “high” setting of this option will not add a trailing after-image.

- k. **COLOR MATRIX:** Affects the overall look by altering how the camera interprets the relationship between colors. Select a “Normal” video look (in which the colors tend to “pop” a little more) or one of two “Cinematic” settings (which tend to offer more nuances within their color palettes).
- l. **COLOR GAIN:** Affects the saturation of all the colors equally. A value of -9 will make the image monochromatic (B&W).
- m. **COLOR PHASE:** Similar to the “hue” control on your television set; negative numbers shift the image toward green, positive numbers shift the image toward magenta.
- n. **R GAIN, G GAIN, B GAIN:** Separate controls adjust the individual saturations of the three primary color components of the video signal.
- o. **COLOR MATRICES (R-G, R-B, G-R, G-B, B-R, B-G):** These controls allow you to fine-tune the color of your image on a professional level. With a master monitor connected to the camera, it’s fast and easy to experiment with these adjustments. You can very rapidly start to see what each color matrix is doing, and zero in on just the right “look”.

RECORDING SETUP: This menu page contains all settings that allow you to adjust the resolution of the image, or to record your own personal identification code along with the video signal. Since the resolution of the HDV and uncompressed HD video signals are not adjustable, most of this menu has to do with the stills that you can capture onto an Memory card. However, if the camera is in SD mode, the top option on this menu page will be REC MODE, which will allow you to choose between SP or LP for your recording speed. It is recommended that you always record in SP.

- 1. **UB REC:** Select whether you want to record your own internal user bit, or one imbedded with time code from an external source. The user bit is your own personal identification tag that can come in handy when organizing your tapes. You can choose any combination of numbers 0-9 or letters A thru F, up to eight characters in total.
- 2. **UB SELECT:** Choose what type of identification tag you want your user bit to be: eight characters of numbers/letters of your choosing, the time, or the date. If you choose either of the latter, you can set time and date on the SYSTEM page (D/TIME SET).
- 3. **IMG QUALITY/IMAGE SIZE:** These two menu items offer standard options for setting the quality of the still photos that will record onto the Memory card. Obviously, the highest Image Quality together with the largest Image Size will make for the best photos, but will take up more space on the card. If the images are being used for on-set reference, you will probably not need the highest quality settings, and will therefore be able to fit many more photos onto a card.

The first step in taking the very best still photos that this camera has to offer would be to switch the TAPE/CARD selector (located on the right-hand

zoom handle) to CARD. Only in CARD mode does the camera switch over to the color space that is maximized for an eventual printed photo. In TAPE mode, you will be still able to capture a photo to an Memory card, but it will contain the video color space, and video has different color requirements than stills. The image will be fine as a reference, but would probably not make for an ideal “official still photo” to represent your production. You should switch over to CARD mode for that.

If you do switch to CARD mode, double check your IMAGE SIZE setting, since the menu item is slightly different than it is in TAPE mode.

4. STILL I. REC: Turns “On” and “Off” the camera’s ability to capture a still photo to the Memory card when you are in TAPE mode. For example, you may have a card loaded with Custom Presets that you do not wish to use for any stills. Instead of trying not to accidentally hit the “Photo” button, you can simply turn this feature “Off” altogether.

The third option is “On + CP Data”. This feature is extremely useful, as it allows you to capture a still photo along with all the meta-data concerning your current Custom Preset. It’s sort of like a script supervisor built-in to your camera. If you need to come back and replicate a shot next week or even next year, you’ll have a still image from the exact camera point-of-view, along with all information regarding the camera settings at the instant the photo was snapped.

5. FILE NOS: Select “Continuous” or “Reset”. This choice only has to do with whether you want the file numbers to be continuous across multiple Memory cards, or reset each time you put a new card into the camera.

AUDIO SETUP: As the title suggests, this menu page contains all options having to do with the camera’s audio signal. See also the CAMERA BODY (AUDIO CONTROLS) section, since most of the audio options are actually available outside of the menu system, and are located on the body itself.

1. AUDIO MODE: You can select two or four channels of audio recording in both HDV and standard definition DV. Be aware, however, that there is a big difference between these two formats.

In HDV, the audio signal is encoded as an MP3 file. The bit rate for two-channel recording is 384 Kbps (with a sampling frequency of 48kHz), while the bit rate for four-channel recording is 192Kbps (also with a sampling frequency of 48kHz). Thus, in HDV, there will not be a noticeable quality drop if you switch to four channel audio recording.

In standard definition DV, however, the audio is encoded as a PCM signal. The two-channel recording is 16 bit (at a sampling frequency of 48kHz), but the four-channel recording drops down to 12 bit (at a sampling frequency of 32 kHz). Thus, you will notice a quality difference if you go that route.

2. 1 kHz TONE: The camera is capable of generating the industry standard reference tone that, when activated, will accompany the color bars. You can set the level of the tone at either –12dB or –20dB, and should consult your editor before choosing. Since digital sound signals are embedded with their

own volume information, these tones are less and less necessary nowadays. However, some editors might still want it for reference.

3. AUD. M. SET: Selecting “Line Out” will introduce a slight delay in the audio, in order to appear perfectly “in-sync” with certain external monitors. “Normal” will allow you to monitor audio in real time. Regardless of this setting, the audio and video recorded on tape will always be synchronized.
4. WIND SCREEN: Activates a frequency filter that removes certain wind noise from the onboard microphone only, while maintaining a well-balanced sound in your crucial dialogue frequencies.
5. R-XLR GAINUP: Activates a 12dB signal boost for any source coming into the rear XLR jacks. Use this when you find yourself dialing the CH1 and CH2 controls more than 3/4 of the way toward “Max”, so that you can increase the strength of the signal and work in the middle range of the dials (where the quality is optimized).
6. AUDIO LOCK: This option is available only in standard definition DV mode. Allows you to lock or unlock the audio.

DISPLAY SETUP: This menu page contains all options regarding messages, guides, and meters that are visible in your electronic viewfinder, but which do NOT record to tape.

1. EVF SETUP: Enables you to adjust the electronic viewfinder’s settings to your liking. If you use a properly calibrated monitor for comparison, you can tweak the viewfinder so it more accurately represents the color and brightness of the actual image. The adjustments are: brightness, contrast, color and sharpness.

You can also use the EVF BW MODE to make the viewfinder monochromatic. Many operators use this option in order to judge the contrast range within the frame.

Helpful Hint: This is a good feature to bring out from the menus and program into one of the two “Custom Keys” on the top of the camera. See the SYSTEM page of the menu for this option.

Whatever you choose to do to the electronic viewfinder, you will not affect the image recorded to tape or transmitted out through any of the terminals.

2. LEV/CENT MRK: Activates either a horizontal line across the frame (“Level” mark) or a center crosshair (“Center” mark). Both are simply for reference and will not record onto the final image. The “Level” mark can be useful if you’re setting up a vast landscape shot, or a shot with a great deal of geometry in the frame. The “Center” mark can sometimes help with composition, particularly if you’re doing a purposely-stylized shot with a subject in the middle of the frame.
3. ASPECT GUIDE: Brings up a wide variety of aspect ratio guides to choose from. Like all the options on this menu page, these lines will not record to tape or transmit out via the digital terminals. These guides allow you to frame for different international television and cinema ratios while capturing the standard 16x9 image. You will therefore have to crop the image in post to match whatever ratio you’ve used to frame your project.

4:3 allows you to compose action within the traditional TV ratio. This is a crucial professional option to have in this transitional period of time, since you may be required to deliver a 16x9 product while framing safely for broadcast on standard televisions. Also included are 13x9 and 14x9 aspect guides.

1.66:1 is the traditional European ratio for motion pictures, whereas 1.85:1 is the most typical ratio for Hollywood movies. 1.75:1 and 2.35:1 aspect guides are also included.

4. **SAFE AREA:** You can choose to set a “Safety Area” of 80% or 90%. These are simply guides to help you compose action safely within a specified area of the frame. 90% is picture safe area and 80% is title safe area.
5. **TV SCREEN:** Turn this feature “On” if you want all the guide information from the electronic viewfinder to be transmitted out via the analog video terminals. This can be useful, for example, if you have someone on-set who is using a video feed to log time code, since they will need to see the time code display. It’s also handy if you have the camera up on a jib arm, and are watching a video display while operating a shot, since you’re still going to need to see all of the viewfinder’s guide information.

Note: This guide information will not be carried out the HDV/DV or SDI terminals.

6. **AUDIO LEVEL:** Turns “On” or “Off” the audio level indicator within the viewfinder (displayed in the lower right-hand corner).
7. **LANGUAGE:** Select the language of the guides and menus.
OBJ DST UNIT: Displays the distance at which the lens is focused, in either meters or feet.
8. **ZOOM IND:** You can monitor where you are within the zoom range either as a “Bar” or a “Number” from 0-99. The “Number” setting can come in handy when you need to exactly repeat a zoom during multiple takes. While the number does not express the exact focal length of the lens, it is repeatable. Thus, if you zoom from 33 to 83 during “take 1”, you’ll know to reset to 33 at the beginning of “take 2”, and you’ll know to stop at 83 when you’re in the middle of the action.
9. **GUIDE INFO:** Display either your “Custom Keys” settings, or the “Date and Time” within the viewfinder.
10. **UB DISPLAY:** Displays your User Bit data within the viewfinder. See the “UB Select” option within the RECORDING SETUP page of the menu if you want to set this up.

SYSTEM: This page contains options that do not fit easily into any of the other headings.

1. **CUSTOM KEY 1/CUSTOM KEY 2:** Allows you to program two features into the “Custom Keys”, which are located on the top of the camera. This way, if you were in the field shooting and wanted to quickly turn on the zebra function, for example, you could have it programmed into one of the easy-access buttons instead of fishing through the menus. Among the possible features that you can program, there are certain ones that can only be accessed in this manner, and are not available anywhere else on the camera:

- a. **VCR STOP:** Activating this feature while the camcorder is in “Record Pause” mode will allow you to turn off the “recorder section” of the camcorder while maintaining power to the camera section. This will enable you to adjust camera settings while saving wear-and-tear on the tape transport and video heads.
 - b. **TC HOLD:** Freezes the display of the time code, while the code continues to run and record to tape at its normal rate. This is helpful when you want to log the time code accurately at a distinct point in the action, without guessing at that number as the code keeps on ticking.
 - c. **CP BKWD KEY:** Reverses the direction in which the camera cycles through the “Custom Presets”.
 - d. **FLIP EVF:** Reverses the display in the electronic viewfinder, both horizontally and vertically. This only affects the display, and will not transmit out or record onto tape. This feature cannot be activated when using HDV compatible XL lenses. Primary use of this option is with any adaptor that reverses the image horizontally and vertically on the CCDs.
2. **WL. REMOTE:** Selects between two distinct frequencies that can be transmitted from the wireless remote controller, or turns the receiver “off” altogether. If you have multiple XL H1 cameras in a given area and are using the remotes, you may want to put different cameras on different remote settings, so that you aren’t affecting more than the camera you’re aiming at. You can set these frequencies on the remote control unit by pressing the REMOTE SET button. Then, hold down the zoom control for over 2 seconds: the “Wide Angle” (W) button will set MODE 1, while the “Telephoto” (T) button will set MODE 2.
 3. **TALLY LAMP:** Controls whether the tally lamp blinks or is solid when you hit “Record”, or allows you to turn it off altogether. Sometimes it can be quite useful to keep the tally lamp “Off” so that the subject—for whatever reason—does not know that the recording is taking place. Some subjects get visibly more nervous when they see the blinking light.
 4. **POWER SAVE:** When this option is turned “On”, the camera will automatically shift into VCR STOP mode after 3 minutes of non-operation, to reduce wear and tear on the drive mechanism and video heads. After an additional 2 minutes, the camcorder will shut off. It can be re-activated by pressing the STANDBY button on the camera body (located along the bottom, next to the WHITE BALANCE controls). All the camera settings are still retained when the camera goes into STANDBY mode.
 5. **D/TIME SET:** Set time zone, date, and time. This information can be displayed by going into the “Guide Info” option on the DISPLAY SETUP page, or can be incorporated into the User Bit data by using the “UB Select” option on the RECORDING SETUP page.
 6. **LED ON/OFF:** Turns off all LED indicators, including power, card access, HD mode, and HDV/DV terminal lights. The tally lamp is automatically shut-off as well, regardless of its individual setting. This comes in handy if you have to go into a dark “stealth” mode, with no visible lights on the camera.

7. CHAR. REC: Permanently superimposes year, month, day, hour, and minute onto the footage. This is ideal for law enforcement applications.
8. DV CONTROL: Enables the XL H1 to control the record and stop functions of a connected IEEE 1394 storage/recording device (provided that device complies with the IEEE 1394 AV/C protocol). Turn this feature “On” if you are using software such as Canon’s Console for camera control and image capture.
9. IRIS DIAL: Reverses the direction of the iris dial, located on the camera body.

Conclusion:

The Canon XL H1 is fully equipped with the professional features you’ll need for any situation you might find yourself in: from guerilla-style documentaries to studio broadcast environments (ENG, documentary and reality/episodic TV production) to feature film productions.