University of Oregon
Department of Cinema Studies

Canon XC15 User Guide for Shooting Video

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1 Viewfinder with Cover

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Written by Kevin May   CC BY-NC-SA v4.0

Camera Guide
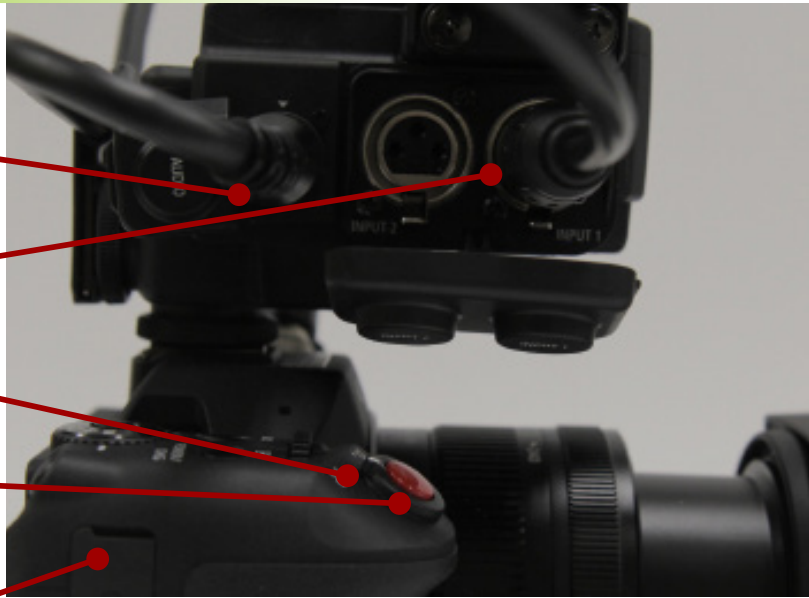
1 Camera Bag

Layout

Audio Adaptor Output

XLR Inputs 1 & 2

Movie/Photo Switch

Record Button

Headphone Output

Audio Adaptor Input

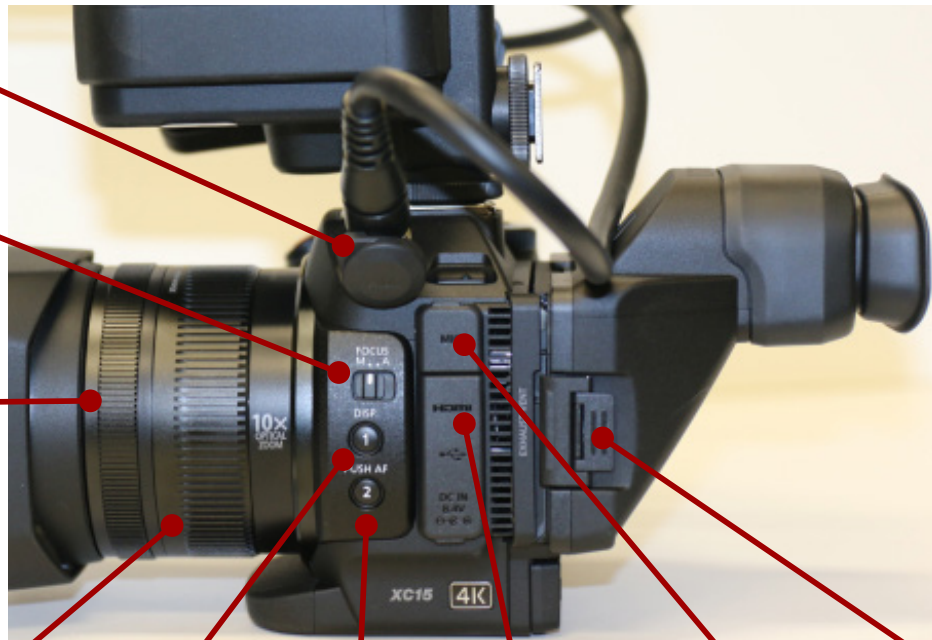Manual/ Auto Focus Switch

Focus Ring

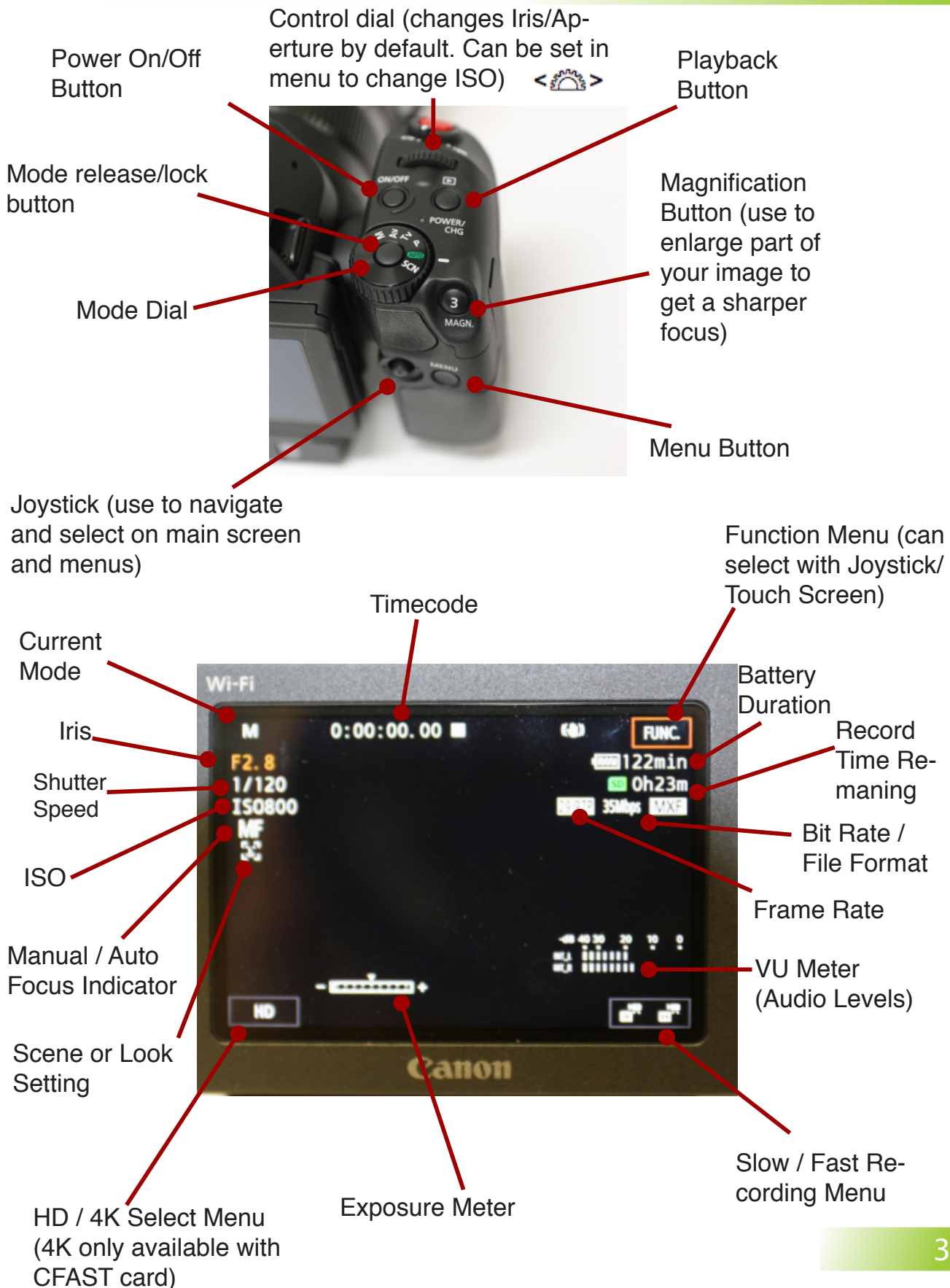Zoom Ring

Button 1 Waveform

Button 2 Peaking

HDMI Output

Aux 1/8" Mic Input

Viewfinder Latch

Power On/Off Button

Control dial (changes Iris/Aperture by default. Can be set in menu to change ISO) $<\text{⚙}>$

Playback Button

Mode release/lock button

Magnification Button (use to enlarge part of your image to get a sharper focus)

Mode Dial

Menu Button

Joystick (use to navigate and select on main screen and menus)

Function Menu (can select with Joystick/ Touch Screen)

Timecode

Current Mode

Battery Duration

Iris

Record Time Remaning

Shutter Speed

ISO

Bit Rate / File Format

Manual / Auto Focus Indicator

Frame Rate

VU Meter (Audio Levels)

Scene or Look Setting

HD / 4K Select Menu (4K only available with CFAST card)

Exposure Meter

Slow / Fast Recording Menu

Assembly - Battery and SD Card

1. To insert the battery, open the battery compartment and gently slide the battery in and close the door. To remove it, power the camera down, open the door and then slide the white lever to release the battery.

Note: You may see a warning that your battery cannot be charged inside the camera. You can ignore this as all LP-E6 batteries will still work to power the camera.

2. To insert an SD card, slide the card open switch towards the left of camera and it will spring open. The XC15 camera can record to SD cards or CFAST cards. (CFAST cards are only needed to record 4K video.) To insert a card gently push it in until you feel the spring lock mechanism click in. To remove an SD card push in slightly to eject the card. To remove a CFAST card you must push the yellow eject button to the right of the card slot. Close slot cover when done.

We recommend SanDisk brand of SD cards. For recording HD video at a high bit rate it is best to use a Class 10 SDHC or SDXC card.

If this switch on the side of the card is set to lock the card will be in Read Only mode. It must be unlocked when you are recording, but it is a good idea to slide it to lock when you are done recording to keep your media safe.
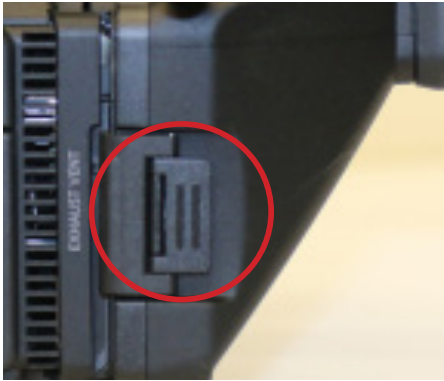
3. You can also attach the viewfinder if you would like. It can be especially helpful when recording outside in bright sunlight. To attach the viewfinder slightly pull out the LCD screen on the back of the camera and fit the viewfinder over the right edge of the screen. Next secure the viewfinder by gently latching it over the left edge of the LCD screen.

4. If you are going to use an XLR Microphone then first connect the audio cable to the camera on the top left. **Make sure the arrows are lined up exactly and don't force the connecton.** Push in slightly until you hear a click. **To pull the cable out pull straight out from the silver collar.**

5. Next attach the MA-400 Audio Adaptor to the Shoe Mount on top of the XC15. Tighten the bottom until it is secure.

6. Next secure the shotgun mic in the mount and then carefully connect the Audio Cable to the Audio Adaptor and the XLR mic cable into Input 1. Lastly, secure the audio cable in the cable clamp at the rear of the audio adaptor. (See page 16 for more details on audio setup.)

Quick Start Guide - Getting Started

1. To begin shooting, assemble the camera rig with all of the components you will need (battery, card, audio adaptor etc.) following the directions on the previous pages.

2. If you are using a tripod carefully attach the camera to the tripod plate by threading in the screw to the base of the camera. Make sure it is secure before you take your hand off the camera. Never leave a camera unattended.

3. Turn ON by holding the ON/OFF Button. Make sure the selector switch is set to Movie Mode.

***You should always initialize your SD Card before you begin shooting. Make sure you've backed up all of your media first as initializing will erase your card.

4. To initialize your SD Card make sure your card is inserted and push the Menu Button. Use the Joystick to navigate to the Recording Setup menu and then select the Initialize option. Along with erasing the card this will also format the card for the XC15 and is important to do even for empty cards.

Important Note: Never turn the power off or open the Card Slot Cover when the Access Light is blinking. Doing so may damage the media on your card.

5. Before you begin recording you should set your resolution and frame rate. In the Recording Setup menu you can select the HD Recording option and choose from 4 different frame rates at HD Resolution. You can select 23.98P, 29.97P, 59.94i, or 59.94P. No matter which frame rate you choose it is important that you film all of your shots with the same frame rate.

***Note that 59.94P will record 50 Mbps and will take up more space on your SD card. Also keep in mind that different frame rates will produce different looks. 23.98 is a traditional cinematic frame rate while 29.97 is a common television frame rate. 59.94 is a smoother frame rate and is more common for online video. Talk with your instructor about which may be best for your work.

6. Now that you are ready to record. You can setup your shot. First you need to choose which Mode you will be shooting in on the Mode Dial.

Auto: All settings (except focus) will automatically adjust for optimal exposure and color balance.

Program Ae (P): Exposure settings will automatically adjust, but white balance is user controlled.

Aperture Priority (Av): The camera adjusts the Shutter and ISO and the user adjusts the Aperture with the Control Dial.

Manual (M): This will allow you to manually adjust all your exposure and white balance settings in the Functions menu.

Focal Length / Zooming and Focusing

The XC15 comes equipped with a 24mm to 240mm zoom lens. This means that you can zoom the lens by turning the zoom ring from wide to long changing your focal length. This will not only affect what's in frame, but it will also affect the perspective within your shot, how much can be in focus at once (Depth of Field or DOF), and the Iris setting (the light coming into the camera.) When you setup your shot choose your focal length carefully and remember you can move the camera towards or away from your subjectt if you need to reframe.

Wide: On the XC15 Wide Focal Lengths are from about 24mm - 35mm. They will give you a greater DOF, meaning that more of your subject can be in sharp focus. They are good for establishing shots and opening up confined spaces, and make dollying easier to keep focus. They can show distance between subjects, but can also make people seem heavier.

Normal: On the XC15 Normal FLs are from about 35mm - 50mm. A normal focal length is similar to what our eyes see in terms of perspective and Field of View. Normal focal lengths are used commonly in dialog scenes.

Long: Long FLs are anything above 50mm. Especially towards the end of the spectrum (240mm) they will produce a shallower DOF and compress the foreground and background. This will create a sense of closeness between subjects/actors and typically will make subjects seem thinner. Use long focal length for CUs, ECUs, some OTS shots, fight scenes, chase scenes.

Focusing: Make sure you occasionally check your focus during the shoot. Your subject may move slightly and focal length or exposure changes may shift your DOF. To get a sharp focus make sure Manual Focus is turned on and zoom in on the subject's eyes or use the Magnification (3) button to digitally zoom in. Then slowly adjust the Focus Ring on the front of the lens until the subject's eyes are in sharp focus. You can also push the Push AF (2) button to turn Peaking on which will put a red outline around what is in focus.

***Note: When you zoom in from 24mm to 240mm an open iris of f/2.8 will automatically close to about f/5.6 making your shot about two stops darker (about 1/4 as bright).

Exposure: Overview and Shutter Speed

There are three primary factors in setting proper exposure on the XC15: 1) Shutter speed 2) ISO and 3) Aperture/f-number. Obviously your lens, filter and lighting decisions will also affect exposure, so make sure you setup your lights and focal length first.

Shutter Speed: Shutter speed is the length of time the sensor is exposed to light. The shutter speed affects how motion looks in your video and how much light is hitting the camera sensor every second. If it is too low the image will be bright, but the motion will look jerky and unnatural.

For natural motion the rule is this: your shutter speed should be twice the speed of your fps. So, if you're shooting at 23.98fps, you should set the shutter to **1/48**; if you're shooting at 29.97fps or 59.98fps, you set the shutter to **1/60 or 1/120 respectively**. **You normally DO NOT adjust shutter speed to obtain proper exposure.** This is why it's important to set your frame rate and shutter speed early when setting up your shot.

Because shutter speed also affects how motion is interpreted, if you want a shot with less motion blur on a fast moving object like a fan, try increasing your shutter to 1/120 or 1/250. This can also help if you are planning on slowing down the shot in post-production. This was used in the the opening scenes of *Saving Private Ryan* to produce a unique look.

To set your shutter speed. Select the Func. option from the main screen with the joystick or touch screen and then select the SHTR setting from the right column. After SHTR is active you can dial in your shutter speed from the selections at the bottom of the screen.
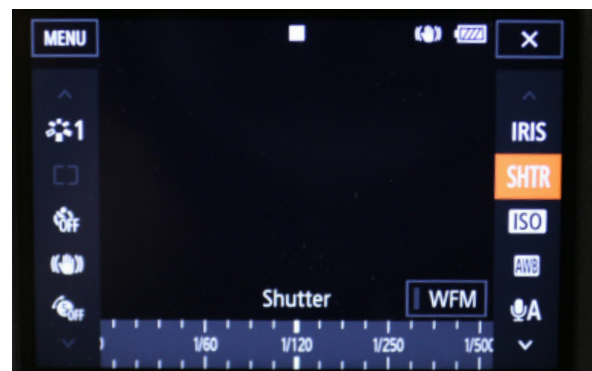
Exposure: ISO and ND Filter

ISO: After choosing your shutter speed you should roughly set your ISO to get proper exposure. ISO controls the camera's sensitivity to light. The higher the ISO the brighter the image will appear. However, the higher you set this number the more "noise" or artifacting you will have. Try to set this as low as possible and adjust lighting to avoid artifacting. Even though ISO can go as high as 20,000 you should rarely crank it above 1600 and try and stay under 800 if you can.

A general rule is that an ISO of 200 is twice as sensitive to light as ISO 100. This is similar to "stopping down" your f-number a full stop, which essentially halves the exposure of your image. In general, for outside shooting set at 320 or below.

To set your ISO select the Func. option from the main screen with the joystick or touch screen and then select the ISO setting from the right column. After the ISO is active you can dial in your ISO value from the selections at the bottom of the screen. After adjusting your aperture you may come back to finalize your ISO.

ND Filter: The XC15 also comes equipped with an ND filter, which can be especially useful when shooting outside or in bright conditions. The ND (Neutral Density) Filter can be turned on in the Camera Setup menu. It will reduce the light coming into your camera by about 3 stops making it significantly darker. **Make sure to turn the ND Filter off when you no longer need it.**

F-Number: The last major factor in exposure is your f-number, also called a f-stop. This controls how much light is let in through the lens, and is also referred to as the "aperture" or "iris." Some people like to set f-number first, then ISO.

Adjusting your f-stop will be the BEST way to control exposure. The smaller the f-number the larger the opening (iris); and the larger the f-number the smaller the iris. Moving to a smaller f-number is "opening up"; a larger f-number is "stopping down" or "closing."

The **XC15 adjusts in 1/4 stops**. Moving a full stop will halve or double the light let in. Full stop f-numbers are: **f/2.8, 4, 5.6, 8, 11.**

***Please note that the XC15 has a variable aperture. This means that **as you zoom in from 24mm to 240mm your f-number will automatically close from f/2.8 to f/5.6** and your image will get about two times darker.

Adjusting your f-number will also change your DOF. Thus the higher the number (smaller iris) will give you a greater DOF; a lower f-number (larger iris) will create a shallower DOF.

You can adjust the f-number in two ways: 1) Use the Control Dial by the record and on/off buttons on the top right of the camera or 2) you can also access it in the Func. menu with the other exposure options.

Shooting Recommendations
- For documentary/news, set from f/4-f/8 for greater DOF.
- For narrative, try f/2.8-f/4 for a shallow DOF. Most narrative films are shot at f/4 or f/5.6.
- Depending on the lens and zoom setting, even at f/2.8 it can be hard to maintain focus.
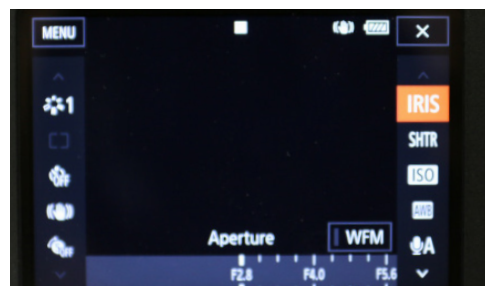
Exposure: Tools and Guides

Light Meter: To measure exposure, typically you use a light meter to get a reading. However, with the XC15 you can use the built-in exposure meter to get a reading. Each marker represents a stop change in the light (half/double the light). The central mark is the "correct" exposure, as determined by the light meter on camera.


***The meter only evaluates the **average** light in the camera frame and cannot spot meter certain parts of the frame. This means that it is not very useful in a scene with high contrast and the "correct" exposure is not always right for every scene.

When you change f# or ISO you will need to compensate by stopping down or opening up f# or ISO, adding light or reducing light. Use the meter AND your eye! If unsure, underexpose at 1/4 stop. You can always bump up exposure in post, but you cannot fix overexposed images in the same manner.

Waveform: The waveform monitor gives you more specific information about the exposure of your image. It measures luminance in the actual pixels of the frame and helps to avoid the averaging of the light meter. You can turn on the waveform (WFM) in the Function menu when adjusting the Iris, Shutter Speed or ISO. You can also turn it on by pushing the DISP. (1) Button on the left of the camera.

The scale of the waveform is from 0 to 100 IRE with markers every 20 IRE. In general, anything registering at 0 is black and anything at 100 is white. If your waveform is registering above 100 your highlights will be clipped, which means you will lose detail in the overexposed areas of the frame. You want to keep your levels under 100 and over 0 for a properly exposed shot.
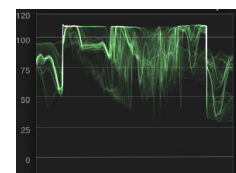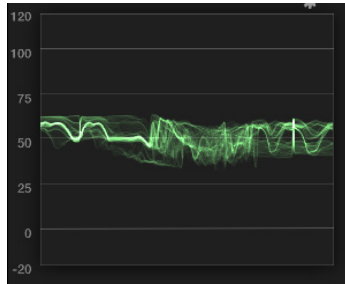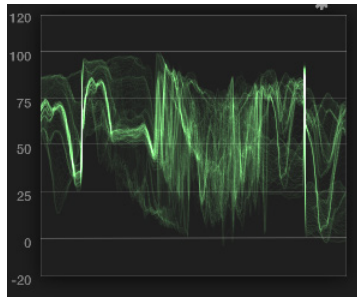

**Over Exposed
Too Bright**
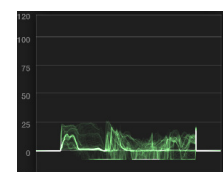
**Under Exposed
Too Dark**

Exposure: Tools and Guides

Flat Image
Little Contrast

Dynamic Image
High Contrast

The waveform can also show you which parts of your frame may be under or over exposed so you can adjust your lighting or framing to correct any issues. The waveform shows luminance information vertically, and will show you which part of the frame is causing the issue horizontally.

In addition to keeping your shot properly exposed the waveform will also show you the contrast of your shot. The images to the left show a flatly lit image with little contrast and a waveform with higher contrast. Contrast is the difference between the bright parts of the image and the dark parts. In general, a shot with more contrast is more aesthetically pleasing and easier for the viewer to know where to look.

You can use a waveform in post-production too when editing your shots to guide your adjustments of the brightness and contrast.

A good rule of thumb is that in a typical scene the face of your subject should be the brightest part of the image, excluding an occasional bright spot or highlight.

Typically in an average interview shot or scene a subject's face should be around 60 or 70 IRE although there are many exceptions to this depending on the specfic shot and lighting.

Exposure: Tools and Guides

Zebra Stripes: One final tool you can use to judge the exposure of your shot is zebra stripes. When you turn zebra stripes on a zebra stripe patten will highlight any parts of your image that are at or above a specific luminance value.
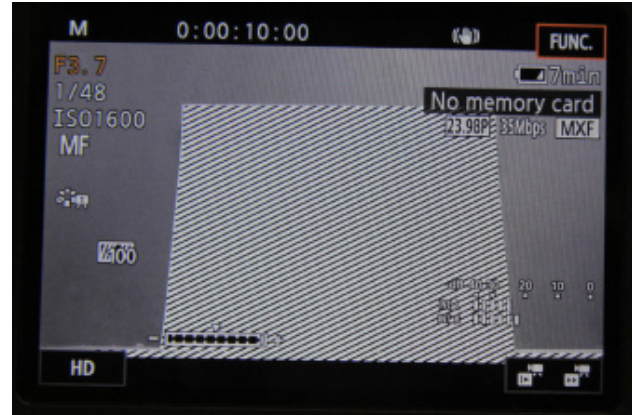
You can find the zebra stripes setting in the Functions menu and select OFF, 70 IRE or 100 IRE.

At 70% the zebra stripes will highlight **parts of the image that are in between 70 and 100 IRE** and are close to being overexposed.

At 100% the zebra stripes will highlight the **parts of the image that are over 100 IRE.** These parts of the image are overexposed and will lose detail in your recording. It is very hard if not impossible to fix overexposed video in post-production. Zebra stripes are an on screen display only and will never be recorded onto your video file.

White Balance: Exposure is color blind, but all light has color. Our eyes naturally color balance over time, but cameras must be set in different lighting conditions to see the color of light correctly. The white balance is set off of what white looks like under the lighting you are shooting in. You should always white balance after you have setup all of the lights and exposure setttings for your scene.

The XC15 has powerful presets for white balancing. To bring up the white balance options select Functions and select the WB setting below the exposure settings.

The color of light is referred to as temperature, measured in kelvin or K. Generally speaking, daylight is 5600K (emitting a blue light), shade is 7000K (bluer), cloud cover emits 6000K (still blue), fluorescent light is 4000K (greenish), and tungsten lights like our light kits give off 3200K (orange/amber).

AWB: This will automatically set white balance. Be careful with the auto setting as this may shift while you are recording.

Presets: Daylight, Shade, Cloudy, White Fluorescent, Daylight Fluorescent, Tungsten

K: When set to K you can set the K value or temperature anywhere between 2000K (very orange light) to 15,000K (very blue light).

Set 1 and 2: Once you have set the camera and lights, you can manually set your white balance by having your subject hold a white card or piece of paper, and then selecting Set 1 or 2 from the White Balance setting. Make sure the card fills the screen and is not over exposed; move the camera to reframe if you need to. Then select the settings option above the Set 1 or 2 setting. Finally select Set WB this will white balance your camera for your current lighting. If you change your lighting, or if you are using sunlight (which changes throughout the day) you will need to manually set your WB after some time passes.
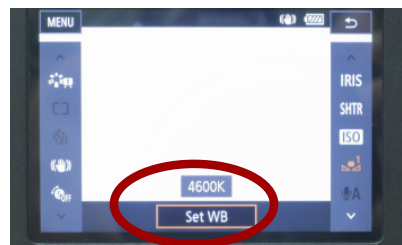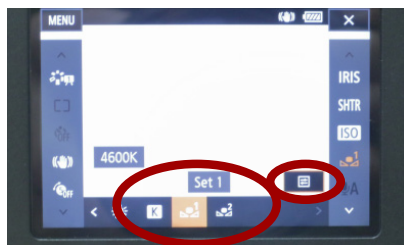
One of the main reasons why you should use manual white balance is because you may have different light sources casting different color temperatures on your scene. For instance, say you're using window light (5600k, blue) as a key light and then you use a tungsten lights (3200k, orange) to fill in the detail or provide rim light. Thus, you'll have both blue and orange light on your subject and it won't look right unless you manually white balance in that specific lighting.

Audio

Audio is just as, if not more, important than all of the video settings discussed in the previous pages. There are three ways to record audio on the XC15.

1) **Built In Mic:** Connecting no external microphone and recording with the built in mic. This method is not recommended for anything beyond a scratch or reference audio channel.

2) **1/8" Mic Input:** Connecting an 1/8" Input to the Aux Mic Input and recording to the camera. This method will work, but only with 1/8" mics. For this option or option 1 you can adjust the audio level in the Audio Setup menu. However, whenever possible it is best to use professional XLR microphones and the seperate Audio Adaptor by following option 3.

3) **XLR Audio Adaptor:** This is the preferred method and what you should do if you are recording audio meant to be in your final edit. Mount the audio adaptor to the shoe mount and then connect it to the audio input with the provided UN-5 cable (more detail on page 5).

In order for the Audio Input to register you must have Input 1/2 turned on in the Audio Setup menu.

Next you can connect 1 or 2 XLR microphones to the adaptor. If you are only using 1 XLR microphone like a Lav Mic or the provided Mini Shotgun Mic you should always connect it to Input 1 so it will go to both channels.

To send the mic connected to Input 1 to both channels you must set the Channel 2 Input to Input 1 in the Audio Setup menu.

Your External Audio Settings on top of the Audio Adaptor will change depending on the mics you are using.

The mics you will checkout from the Cinema Studies Equipment Room will work without batteries if you turn the Input switches to Mic +48V. This will turn on Phantom Power and will power the microphones. If the inputs are set to just Mic they will not register the microphone without a battery.

To control your Audio Level set the Auto/Manual switches to M and then you can adjust the Audio Level by adjusting the dials for each channel.

On your lower right hand corner of the main display you can use the VU meter to see your Audio Level for both channels. As a general rule, set your audio levels to peak between -12dB to -6dB. Your peaks should never be hitting 0 as this will distort your audio.

In addition to looking at the VU Meter you should also always be using headphones to listen to the audio quality. The Headphone output is on the right side of the camera.

Looks (Picture Profiles)

The XC15 has numerous Looks or Picture Profiles that it can shoot in. Each of the different Looks will affect the over-all contrast, sharpness and color depth of your image. To change or adjust the selected Look go into the Functions menu and select the Looks setting on the left hand side.
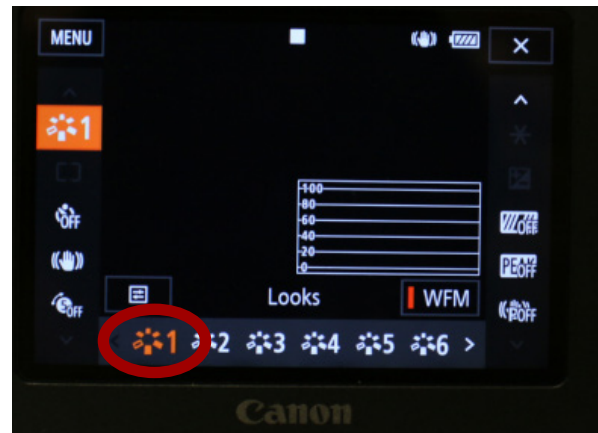
Next you can select from one of 9 Preset Looks (some of which can be modified) from the bottom. There are also two User defined Looks at the end that you can choose from and then adjust to your liking.

In general, the default Look #1 (Standard) will work well and you should only adjust it if you know what you are doing or if you are exploring and testing the Looks. Many Looks such as Look #6 (Canon Log) will allow you to potentially get a much richer image, but will require signifcant Color Grading in post-production to look right.

SD Cards/MXF Files

You should transfer files from your SD card to a computer and external hard drive using the SD card slot on the computers or a card reader. Before transferring we recommend you turn on the LOCK switch on your SD card.

When you insert or connect the card to a computer you should see the card icon on the desktop. We recommend that you make a specifically named and organized folder on your external drive for each SD card related to your project and to move all files and folders from the SD card to your named folder. After your media is on the computer you can then import the files into your editing program such as Final Cut Pro or Premiere.

The XC15 records your video files as MXF files. You will find your files on your card at this location:
CANON > CONTENTS > CLIPS001.

It is important to not rename your media files in the Finder. It is best to keep them saved in named folders organized by project and date and then to use selection tools inside the editing program to organize and annotate them further.

After your media is copied to your hard drive and imported correctly you may eject your SD card and then after confirming that your media is still available in your editing program you may then re-format/intialize your card again in the camera to prepare for your next shoot.

For more info on file and media management go to this site:
blogs.uoregon.edu/uocinetech/hard-drives-and-memory-cards/file-management-workflow/