

University of Oregon
Department of Cinema Studies



**Canon XC15 User Guide for
Shooting Video**

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What's in the Kit?



1 Canon XC15 Camera Body with 2.8/f zoom lens and a lens cap and lens hood



1 MA-400 Audio Adaptor with Shotgun Microphone



2 LP-E6 Batteries



1 UN-5 Audio Cable



1 Viewfinder with Cover



1 Lens Cloth



1 Camera Bag

Layout

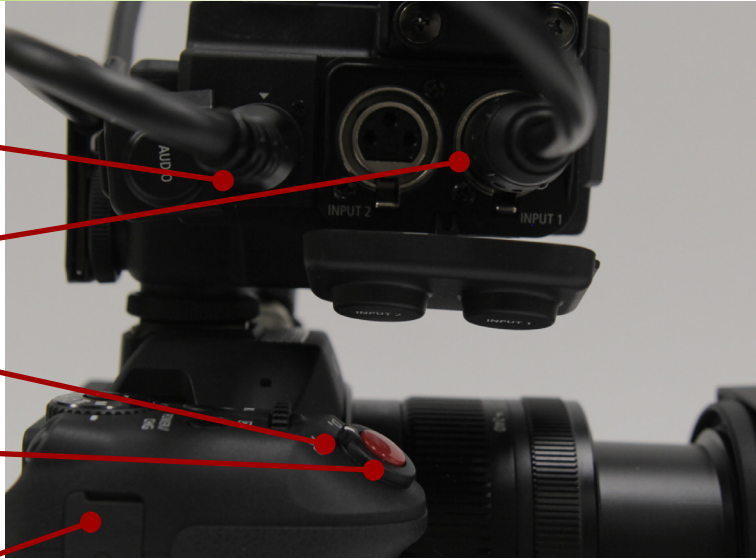
Audio Adaptor Output

XLR Inputs 1 & 2

Movie/Photo Switch

Record Button

Headphone Output



Audio Adaptor Input

Manual/ Auto Focus Switch

Focus Ring

Zoom Ring

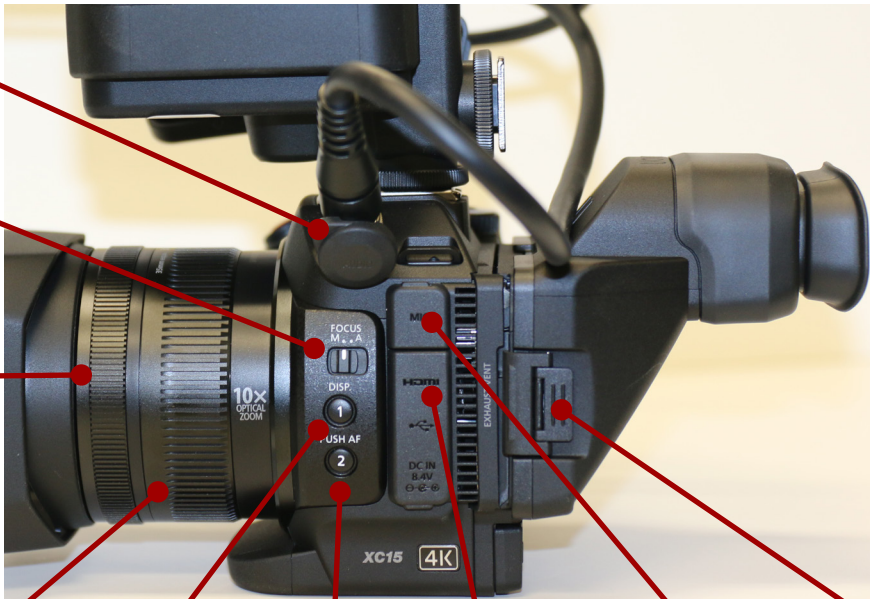
Button 1
Waveform

Button 2
Peaking

HDMI
Output

Aux 1/8"
Mic Input

Viewfinder
Latch



Layout

Control dial (changes Iris/Aperture by default. Can be set in menu to change ISO)

Power On/Off Button

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 Remaining

Shutter Speed

Bit Rate / File Format

ISO

Frame Rate

Manual / Auto Focus Indicator

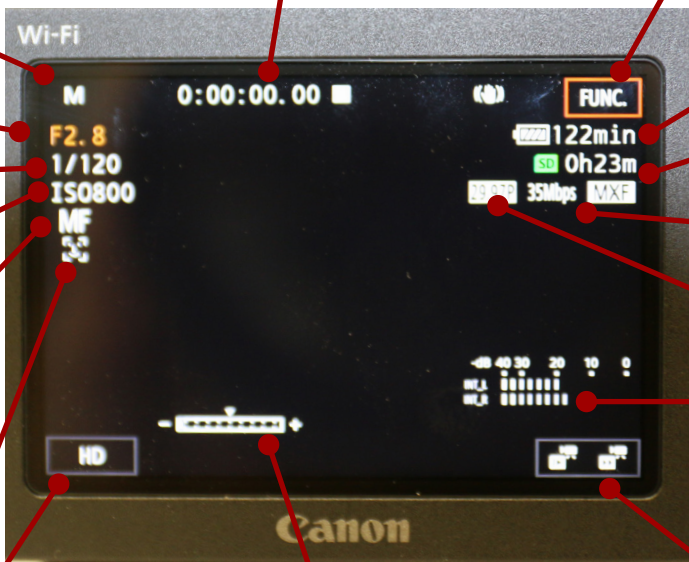
VU Meter (Audio Levels)

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.

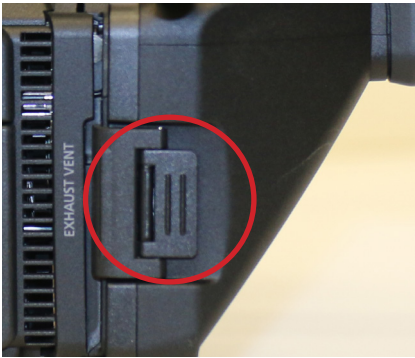
2. To insert an SD card, slide the card open switch towards the left of camera and it will spring open. The XC15 camera can record to SD cards or CFAST cards. (CFAST cards are only needed to record 4K video.) To insert a card gently push it in until you feel the spring lock mechanism click in. To remove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



Assembly - Viewfinder and Audio



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 connection.** 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.

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 subject 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

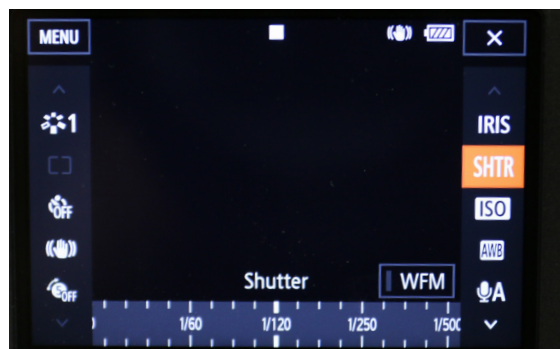
There are three primary factors in setting proper exposure on the XC15: 1) Shutter speed 2) ISO and 3) Aperture/f-number. Obviously your lens, filter and lighting decisions will also affect exposure, so make sure you setup your lights and focal length first.

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.**



Exposure: Aperture/Iris

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.”

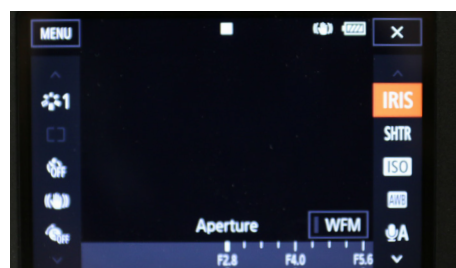
The **XC15 can adjust in 1/4 stops**. Moving a full stop will halve or double the light let in. Full stop f-numbers are: **f/2.8, 4, 5.6, 8, 11**.

***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.

- 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.

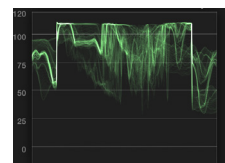


***The meter only evaluates the **average** light in the camera frame and cannot spot meter certain parts of the frame. This means that it is not very useful in a scene with high contrast and the “correct” exposure is not always right for every scene.

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 over-exposed 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**



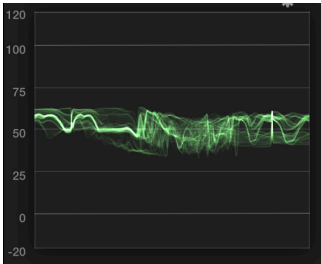
**Under Exposed
Too Dark**

Exposure: Tools and Guides

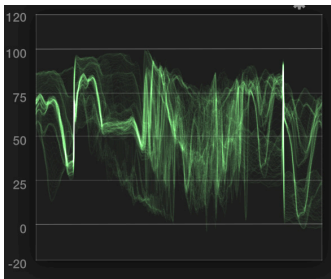
The waveform can also show you which parts of your frame may be under or over exposed so you can adjust your lighting or framing to correct any issues. The waveform shows luminance information vertically, and will show you which part of the frame is causing the issue horizontally.

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.



**Flat Image
Little Contrast**



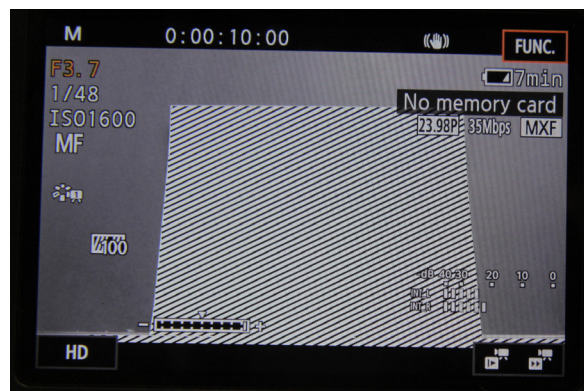
**Dynamic Image
High Contrast**

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 specific 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 pattern 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 settings 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.

White Balance

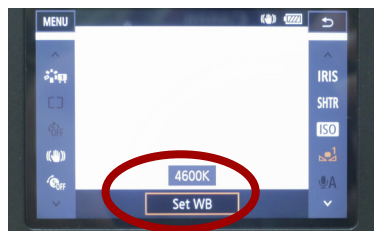
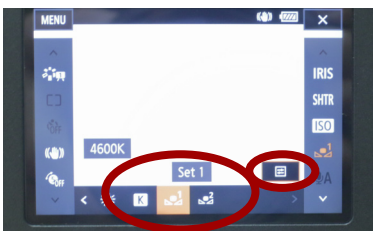
The color of light is referred to as temperature, measured in kelvin or K. Generally speaking, daylight is 5600K (emitting a blue light), shade is 7000K (bluer), cloud cover emits 6000K (still blue), fluorescent light is 4000K (greenish), and tungsten lights like our light kits give off 3200K (orange/amber).

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.

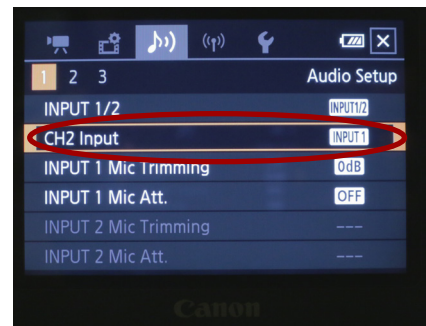
2) **1/8" Mic Input:** Connecting an 1/8" Input to the Aux Mic Input and recording to the camera. This method will work, but only with 1/8" mics. For this option or option 1 you can adjust the audio level in the Audio Setup menu. However, whenever possible it is best to use professional XLR microphones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



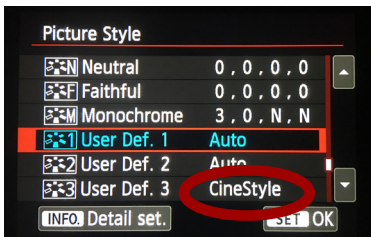
Next you can select from one of 9 Preset Looks (some of which can be modified) from the bottom. There are also two User defined Looks at the end that you can choose from and then adjust to your liking.

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 significant Color Grading in post-production to look right.

Picture Profiles



Scroll to User Def. 1 using Main Dial. Press INFO to customize. Use Multi Controller to turn sharpness off, turn the contrast off, and dial down saturation one to three pips. 70Ds also have CineStyle profile under User Def. 3 that you should use.



(line/edge contrast)
 Contrast (difference between light/dark)
 Saturation (color separation)



Flat images will maintain line detail and prevent loss of detail in shadows. You add sharpness using aperture and focus (sharpness in the camera is “fake” sharpness). Flat images are softer and you avoid aliasing. You add contrast and saturation in post to achieve your “look.”



Contrast/sharp Image



Flat Image

Focus

Now that we have our exposure correct, white balance set, and a flat image, the last element before we record is to focus our image. Make sure the lens is set to MF.

Move the white box on LCD screen using the Multi-Controller to area you want to achieve focus on. Then press the focus assist button once to magnify x5, twice to magnify x10, and a third time to go back to Live View.



Once you have magnified your image. Turn the focus ring until you have critical focus on your subject (often the eyeball). Then, press the focus assist to return to Live View. You are now ready to record!!! To begin recording press the START/STOP; to stop recording press the button again.

To play back footage hit the playback button on back of the camera. While in playback mode, use any of the dials to select files, and the focus assist buttons to see more or less file thumbnails. <▶>

***To pull focus you will want to use a follow focus/focus shifter or rubber band method. Confirm with your instructor how to mark for focus pulls without damaging lens, but please don't use tape or grease pencils.

Audio

Any audio that you record using the camera's on-board mic, or any input into the 1/8" mic jack on camera, should be for sync purposes ONLY. You should NEVER record your audio intended for use in the final product on the camera, but you NEED to still record audio as a scratch track for syncing it in post. These mics pick up all of the noise from the camera mechanism and all handling of the camera/lens.

You should record audio you intend to use on the final product to a ZOOM H4N or other digital recorder. All DSLRs have unbalanced audio inputs, which are not suitable for professional audio. Also, the 70D does not have a headphone jack, so you have no way of monitoring your audio. While interfaces are available w/ XLR inputs and channel gain, they still push the signal through the camera's unbalanced 1/8" input and audio card.

Make sure that your camera is recording audio. Set up a mic to an external audio recorder. Use a clapper board or clap your hands in front of the camera before "Action" is called by the director. This clap is important for manually syncing audio to picture. If you cannot use a clap/clapper at beginning of a take, you will do this after the take for the same sync purpose.

As a general rule, set your audio levels on your external recorder to peak between -12dB to -6dB. Please see the user guide for the audio/boom kits for more information.

Transfer/Transcode/Backup

Transfer files from your SD card to a computer/external drive using the SD card slot on the computers or a card reader. Try to avoid using the camera for this.

Before transferring we recommend you turn the LOCK on on your SD card.

We recommend that you make a folder on your external drive of your original footage and that, if you can, back this footage up on another external drive or computer. When the drive icon pops up, you will find your files here: EOS_DIGITAL > DCIM > 100CANON

Try to avoid renaming or moving files. Many NLEs require specific folder structure for transfer/transcode, so after you move files to your external drive you will import from there (not the card). Here is a basic folder structure for transferring to your external drive: External Drive > Music Video > Footage > Day 1 Shoot > DCIM

The 70D shoots in the h.264 codec using the .MOV wrapper. When you import these files into an NLE it will transcode them to the proper codec for editing, usually creating new files.

Once you have backed up your files we recommend that you reformat your card instead of going through it on the camera or on the computer and erasing the files manually. Try and back up your original media in two locations.

Maintenance

Let's start the maintenance and care section with what NOT to do.

1. NEVER EVER touch the sensor inside the camera. In fact, if this is dirty, please notify an EM in Room 18. The camera has an auto-cleaner for the sensor, but sometimes this needs to be done manually (don't do this).
2. NEVER use anything other than a lens tissue or microfiber lens cleaning cloth. You will scratch the lens.
3. De-lens the camera only when you're a) done shooting or b) changing out the lens. You do not need to de-lens every time you put the camera in the bag.
4. NEVER EVER use canned air EVER on this camera or lens. Each kit has an air blower.

What you should do.

1. To clean dust or sand from lens, hold the camera/lens pointing down. Blow the air up. This will loosen all dust and it will fall out. You can blow dust out of lens caps as well.
2. If you have a microfiber cloth or lens tissue and lens cleaner, you can remove dust or finger grease by using very little cleaner and ALWAYS rub in a circular fashion. A microfiber clothe can remove grease from LCD as well.
3. Always make sure you have lens caps on the lenses.
4. Contact cinemastudiessuper@gmail.com for more help with this.