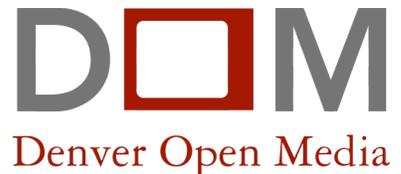


## Welcome to the Field Production Workshop at Denver Open Media



**First things first, introductions!**

### **The Equipment You Will Learn About in this Class:**

- The Canon XL1 vs. smaller DV cameras
- Handheld, shotgun, & lavalier/lapel microphones & audio cables
- DOM light kits & reflectors
- Tripods & monopods
- The DOM equipment scheduler (if you are a DOM member)

### **First things first, DOM Policies:**

1. This class certifies you to use the DOM equipment covered in this class.
2. Once certified, you can rent DOM equipment at commercial rates, or you can purchase a DOM membership and check-out DOM equipment free of charge. (Currently, a DOM Field Membership costs \$175. Under this membership, individuals may reserve one complete field package, including but not exceeding: 1 camera and accessories, 2 batteries, 2 microphones and cables, one camera support, 1 light kit with accessories, field monitor and headphones for 24 hours, or for 72 hours if you rent Saturday-Tuesday. For equipment needed beyond these quantities, members will be charged reduced commercial rates, aka “member rates”.)
3. If you are accessing our equipment through your DOM membership, all material you create using DOM equipment must be non-commercial in nature and be submitted to air on our channels with a Creative Commons Attribution-Noncommercial-Share Alike license. If your material is commercial in nature and/or cannot air on our station, you must rent our equipment at the commercial rates.
4. If you are accessing our equipment through your DOM membership, neither you nor your crew may be paid to produce your video project. If you are getting paid, you must rent the equipment at the commercial rates. Certain exceptions are made for nonprofit organizations based on project proposals. Please see our Station Director for more information.
5. Uncertified people cannot touch DOM equipment.
6. Damage to the equipment due to inappropriate use is the responsibility of the user. Damage to the equipment due to normal wear and tear is the responsibility of Denver Open Media.

**Pause to watch and critique class videos.**

## 1. Your Primary Tool: The Digital Video Camera

When you complete this class, you will be certified to access the Canon XL1 cameras and the smaller Panasonic 3-chip cameras. (Please note that we also have a Sony PD-170 that is available for an additional fee.) People often think that the more expensive cameras like the XL1 are higher-resolution than the cheaper & smaller DV cameras. Unless you're dealing with a high definition camera, all DV cameras are the same resolution (about 500 lines of resolution). Even a \$200 mini DV camera is exactly the same resolution as a \$4,000 camera like the XL1. What you are actually paying for is to have more control over your audio and other settings (i.e. iris and shutter speed.)

### How a DV Camera works:

Light comes into the lens just like a film camera, through an aperture (iris), past a shutter, and onto something thing that captures the image. In a film camera that something is a piece of film that gets exposed to a small amount of a light that is focused by the lens for a tiny fraction of a second, over and over again, dozens of times each second. In a DV Camera, the light is focused onto a chip, or a "charge coupled device" that samples the light that hits it and turns that image into a bunch of ones and zeroes that it stores on a magnetic mini DV tape.

DV cameras compress footage to make the data files smaller in order that they can fit on tapes and hard drives and be easier to work with. That compression causes less quality in color representation. To compensate for this, higher-end 3-chip cameras use a prism to split the light and use a separate CCD (charge-coupled device) for each of the primary colors: red, green, and blue; significantly improving image quality (see picture below). The CCDs in your camera are generally sampled every 60th of a second and recorded to tape. Every camera available from Denver Open Media is a 3-chip camera.



## Understanding the controls on Your Camera:

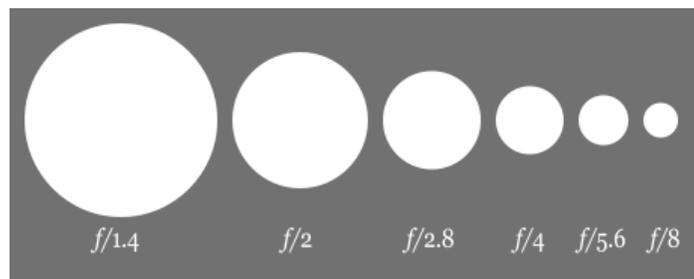
The two primary tools you use in any camera to control the brightness and quality of image are: Shutter Speed and Iris.

**Shutter Speed:** **Pause for Shutter Speed video.** Shutter Speed affects brightness and sharpness of motion. The shutter speed determines how long the shutter opens to expose each frame. Slow shutter speeds let in more light because the shutter is open longer, such as 1/60th of a second or slower, so they result in brighter images, but blur motion, and should generally be used only when you are not recording any fast-moving subjects, when you are not zoomed in too far, and when using a tripod. (Remember: Zooming in tends to show motion and blur more easily.)

As mentioned previously, the CCDs in your camera are generally sampled every 60th of a second (unless 24p or 30p), and so 1/60th is often the slowest shutter speed available. Speed it up, your picture gets darker and motion gets sharper. Slow it down, your picture gets brighter and motion is blurred. (Please note that the PD-170 does allow for shutter speeds as slow as 1/25<sup>th</sup> of a second.)

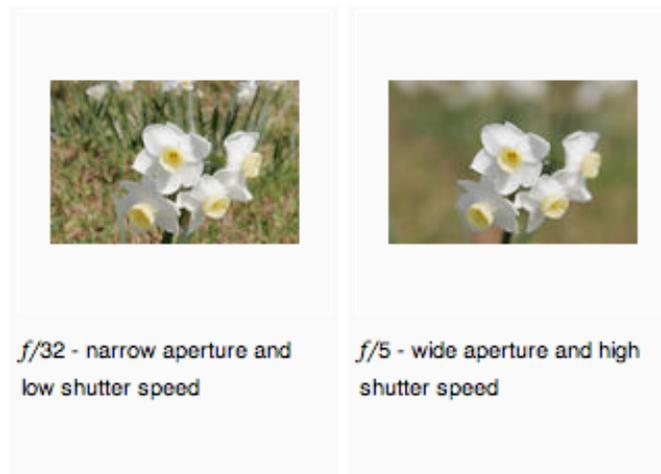
**Iris (Aka “Aperture” or sometimes, “F-Stop”):** Iris affects brightness and depth of field, or focus. The light travels through your lens, through your iris (or aperture) before hitting your CCDs. The aperture affects both the amount of light that reaches the CCDs, as well as the focus of that light.

When you open the iris on your camera your picture gets brighter, allowing you to film in dimmer conditions, but your depth of field narrows and it is harder to keep your images in focus. (Although it seems a bit backwards: **the smaller the corresponding number of your aperture, the bigger the opening is.** i.e. an f-stop of 2 is a bigger aperture than an f-stop of 8.)



If you want people paying attention to something in particular, the best thing is to have a narrow depth of focus because things in front or back of the designated object will be out of focus, whereas with a small aperture everything would be in focus. In order to achieve this effect you should place the camera as far from the background as possible, and make sure there is also ample space between the subject and the camera.

This will ensure that your background is out of focus, and will prevent your scene from looking flat and cramped. **Pause for Depth of Field Video.**



**Concept Break - Focus:** The strongest tool in the cinematographer's bag of tricks, as far as controlling what your viewer looks at, is focus. A full-face close-up in sharp focus in the foreground will dominate the audience's attention, diverting their attention from a softer, unfocused figure in the background. Conversely, a figure in soft focus in the foreground can occupy more than half the frame and yet attract less attention than a smaller figure in the background, proving that focus is more important than the location or size of the object.

**Rack Focus:** A shot where focus is changed while shooting. A rack focus shot is usually done to shift attention from one thing to another.

**Gain:** Your camera's ability to have a large aperture is what makes it more expensive. Gain is cheap. Gain electronically boosts the brightness of your picture, but adds graininess and reduces image quality i.e. noise is added and your colors are muted.) **Avoid using gain whenever possible**, and when you must use it, try to limit the amount of gain as much as you can (unfortunately in a lot of the smaller, less-expensive cameras gain is automatically added in low-light conditions and there is no way to turn it off.)

If you are in a situation where your image looks dark, first adjust the shutter speed, then adjust your iris, and finally add more lights if necessary. Only use gain when the aliens have landed and you have no other choice. **Pause to demonstrate the effect of using gain.**

**ND (Neutral Density Filter):** The Neutral Density filter affects the brightness of picture. An ND filter is the equivalent of putting a pair of sunglasses on your camera; it is simply a dark piece of glass or plastic that reduces the amount of light coming into your camera. The reason it is called a *neutral* density filter is that it does not affect the quality of your image. Most often a neutral density filter is used outdoors on bright days to keep from forcing you to max out your shutter speed and keep your iris settings as low as possible to reduce the light. An ND filter will allow you to use a slower shutter speed for blurry

motion or a larger aperture for shallow depth of field, even when the light calls for fast shutter and small iris. **There is no reason to use the ND filter indoors.**

### **Image Stabilization:**

**OIS:** More advanced cameras, like the XL1, have optical image stabilization, which reacts to actual camera shake, not to changes in image. If you have it, **you'll want to leave it turned on, as it will almost always make your image better.** The only time you'd want to turn it off is if you really want a shaky image.

**Tripods and Monopods:** Mechanical Image Stabilization, in its simplest form, can be as simple as pinning the camera up against a wall or resting your elbows on a table. In its most complex form, it is a crane or a camera jib. The tripod is always your best, most stable option when you don't need to move the camera. A monopod is a cheap, mobile option with one pole that you hold steady yourself as it rests on the ground. A monopod is always better than a hand-held when you don't want an intentionally shaky image. **99.9% of your shots should be on a tripod.** Also, you should make all of your camera movements when the camera is turned off. Even if you want to pan, try instead to take a bunch of static shots.

**Concept Break - Zooming: Pause for zooming video.** Zooming is often considered an amateur technique and is rarely seen in professional film and TV. Whenever possible, physically moving the camera in or out is almost always preferred. When you see zooming it is usually with dollies, jibs or cranes and since we don't have them you should keep the camera still. Again, going from still shot to still shot is always best. If you want to show a wide shot and follow it with a close-up, instead of zooming you can set up the wide shot, turn off the camera, and then set up the close shot, moving from still shot to still shot.

Zoom affects not only the closeness of the picture, but also the steadiness of the picture. If you do not have a tripod, a good rule of thumb is to stay fairly wide (zoomed out). The more you zoom, the more noticeable a shaky camera becomes, and your footage becomes useless.

**Concept Break - Framing:** refers to the placement and movement of the frame itself. Like any painter, the cinematographer gets to decide what items are inside and outside of the frame of his picture, as well as how the items are arranged within that frame. Of course film and video differ from most other forms of art, in that the frame itself can move. Dolly shots, pans, zooms, tilts, etc. are unique tools of the cinematographer.

**Framing for Beginners:** An important tip for beginners is to conduct ALL your camera movement while the camera is off, and only record stationary shots. Watching good TV and film, you'll notice that the vast majority of shots are stationary and contain no frame movement. Beginners tend to want to move the camera to keep things interesting, but the end result is

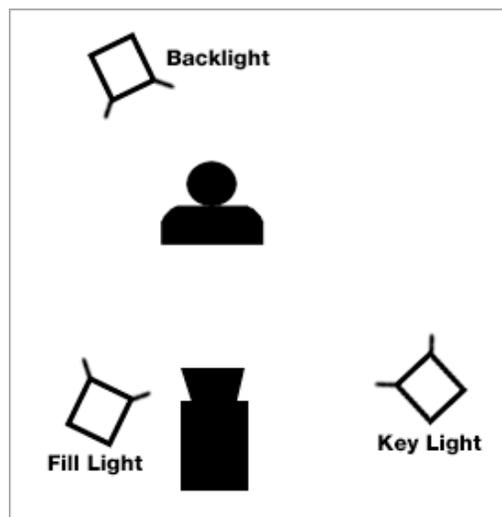
often chaotic. More experienced cinematographers often learn to keep most shots interesting using placement alone, resorting to movement of objects within the frame or of the frame itself, only on special occasions.

**Teachers: Briefly explain action-safe and title-safe in regards to framing.**

## Lighting

**Basic 3-point lighting setup: Pause for 3-pt. lighting video.**

- The Key Light: **The primary source of light for your shot.** This light is used to illuminate your subject. Everything else is used to make your shot look pretty. The key is a bright light shown on the broad side of the subject's face, usually at eye-level or significantly above and off to one side (which is more what we are used to), so there is some depth and shadows created.
- The Fill Light: A diffused light, dimmer than the key, the fill light is placed on the opposite side of the subject, filling the shadows left by the key light and ensuring the entire subject is properly exposed. (A reflector can also serve as a fill light.)
- The Back Light: A small light, above and behind the subject, shining on the back of their head and shoulders, the back light casts a glow in the subject's hair and atop their shoulders, which helps to separate them from the background.



(In this situation, your interviewer would sit between the fill light and the camera.)

## Other Lighting Tools:

It's important to be familiar with the kinds of lighting tools that are out there, and what each is used for. The four kinds of lighting "fixtures" we address in this class are:

- **The Pan (Lowell's Tota):** A small, open-faced light with a long-skinny shape. It's called a pan, because it is shaped to provide a wide, thin light that you can pan across. Larger pan lights are also referred to as "Broads". Pan lights are usually used for fill, backlight, and set lighting. (A Tota light with an umbrella pointed AWAY from your subject can serve as a good fill light. By moving it further/closer from the subject you can adjust this light.)
- **The Spot (Lowell's Omni):** These are the most common type of lights you see. Usually a square or round open-faced light designed to throw a bright light; spots can be used as a key, fill, or backlight. Use your thumb to control the intensity of the light, and the barndoors to control the focus.
- **Soft:** Soft lights provide a soft, diffused light, used as a fill to light the shadows left by the harsher key light. Usually a Spot light covered with diffusion such as diffusion gel or umbrella diffuser; a Soft light is best used as a fill.

**When moving lights, be sure to switch them off first so there is no breakage.**

**Bulbs:** For the most part, any of the below bulbs can be found in any of the above fixtures.

Different lights have different color temperatures and the camera is much more sensitive to these differences than the eye. Flame, fire or candlelight (orange), household lights (yellow), tungsten, halogen and photoflood (between yellow and green), fluorescents (greenish), sunshine or daylight (blue). **Refer to the ROYGBIV handout. Pause for Gels video.**

**White Balance:** You can adjust your camera's White Balance to see a white surface illuminated by any of the above light sources as white. There are pre-sets for indoor and outdoor lighting, and a custom white-balance setting for everything in-between. To use the custom white balance setting, turn your white-balance setting to Custom, point the camera at a white surface illuminated by the same lighting as your subject, zoom in to fill the frame with the white surface, and then press the white balance button. Make sure that you white balance in the same light as your subject, NOT immediately in front of your camera. **Pause for white balance demonstration.**

It is important to note that the custom white balance setting does NOT rectify the problems caused by having different light sources of

differing color temperatures. The most common example is when filming indoors with light coming through a window serving as a fill or key light. This will often result in the two sides of your subject looking different. The simplest solution to this situation is using a Gel. Before you white balance, neutralize/make your environment the same color, then white balance.

### **Other Tools:**

**Gels:** A gel is a colored plastic covering that changes the color temperature of a light, usually to match other light sources. For example, a blue gel over an indoor light will match its color temperature to sunlight. (Please note that gels are not available through DOM but can be bought at any film/video supply store for about 60-70 cents a piece or \$10 a set.)

**Diffusion:** Most light kits will also include an opaque or finely textured gel that helps to diffuse the light (i.e. spread it out), making it more suitable as a fill. Other ways to diffuse light include: reflecting it off a wall or ceiling or reflecting it off an umbrella reflector. As a rule of thumb, shots tend to look better when the light is diffused. FYI the best conditions to shoot outdoors is on an overcast day when the light is naturally diffused.

**Barndoors:** The flags that come on most light kits that you can open and close to adjust the shape and amount of light coming from the light.

**Flags:** A flag is technically ANY material or object which blocks light completely. So, your metal barndoors, or even a reflector that you use to block the light, are flags.

**Scrims:** The round, metal mesh, screen-door-like frames that come with DOM light kits are an example of a scrim. They dim (and to a small extent diffuse) the light. Many people will use scrim and net interchangeably, and on movie-sets, the huge, white fabric panels people use to diffuse and dim sunlight are referred to as scrims.

**Shooting Outdoors:** Outdoor lighting is usually easiest to work with on cloudy or overcast days, or at dusk and dawn. Shooting under direct, midday sunlight will usually appear very harsh and flat. The light can be significantly adjusted with nets, scrims, and reflectors. When shooting outdoors, you should still be aware of creating a good 3-point light set-up.

**Reflector set:** **Pause for reflectors video.** These fairly inexpensive sets of collapsible fabric rings are a MUST for anyone who plans to shoot frequently outdoors. Used to improve the quality of light, inside or out, a standard set will include a white fabric reflector that can be used as a soft reflector or as a net, to shade the sun from the subject, but allow enough diffused light to pass through to get good exposure.

## **Audio**

Audio is the most important element for conveying meaning. If something is wrong with your picture, you can always use a different picture and still convey the meaning, but if your audio is bad, you're stuck with it.

### **Types of Microphones: Pause for Microphone video.**

- **Camera or built-in mic:** To be used only when your audio is coming from multiple sources that cannot be easily mic'd. The camera-mounted microphone is actually a shotgun mic.
- **Handheld microphone:** The most common kind of mics. They only pick up sounds from things that are close to the microphone, which makes them well-suited for use in noisy situations.
- **Lavaliere:** A lavaliere mic or "lapel" mic is a small clip-on microphone most commonly used in sit-down interviews and non-narrative video. These mics require power, so you either need a battery-pack or a camera with phantom power (Please note that the Canon XLI does not have phantom power.) They pick up a lot of ambient sound, so they are not always recommended for noisy situations. When using a lav mic, be aware of things around the mic that may rub against it and interfere with the audio you are trying to record. For example, long hair and necklaces can rub against the mic, causing extra noise.
- **Shotgun mic:** Directional microphones best used for capturing sound at a distance. Shotgun mics are most commonly used in narrative filmmaking, where you do not want to see any microphone in your shot, and are often attached to boom poles. They do however pick up a lot of ambient sounds as well, so you must have good control over your environment. Tip: When using a shotgun mic, put it into the frame and then slowly pull it out until you just can't see it anymore.

**XLR Cables:** Cables used to connect microphones to cameras. When connecting mics to cables, make sure they CLICK in.

Note: Anytime you're filming something that uses a PA system, it's best to get your sound from the PA instead of a microphone because it is cleaner.

### **Tips and Techniques:**

Here are some suggestions for capturing good sound:

- **Never film without headphones.** There is no fix for bad audio...in a way it is more important than capturing good video.
- In general, you want the mic as close to a person's mouth as possible
- Record 10 seconds of room tone. This will be very useful when editing to cover areas where the sound doesn't work for whatever reason.

- If you are in a position to choose the environment, make sure that you choose a location that is far from any fans or rattling furnaces, traffic, screaming children, etc.
- If there is a lot of excess noise, make sure you film some of it (i.e. kids playing) to include as an establishing shot.

**Manual audio settings:** As previously mentioned, the Canon XL-1 does not have phantom power so it cannot power mics, therefore you must use batteries in your microphones. You can't adjust right and left audio independently, you can only control balance and overall level which together can do the same thing.

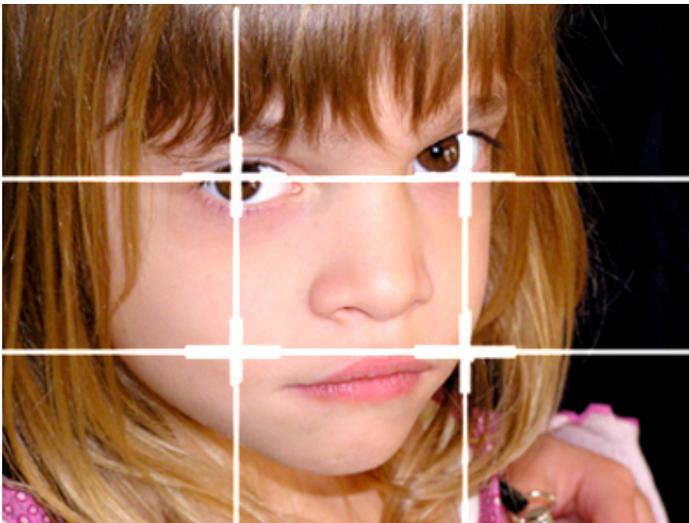
It's always a good idea when you only have one mic to offset your left and right channels so one is louder; that helps ensure that if something super loud or quiet happens, one of the channels will capture it well.

## Cinematography

Once you understand how to use camera setting, lighting, and audio to capture good video, the next step towards producing high-quality footage is the composition of your shots, also known as your cinematography. The idea is: **as a filmmaker, you always want to understand where your audience will be looking, and you want to be able to subtly control where they focus within each shot.**

It's important where you place people and objects in the frame across all three dimensions: up and down, left to right, and near to far.

**Rule of Thirds:** **Pause for Rule of Thirds video.** When filming people, regardless of the shot (whether a close-up or wide shot) you want the



subject's eyes in the top third of the frame. Any shot is aesthetically more pleasing to the viewer when the rule of thirds is followed. If you watch any professional video you'll see the rule of thirds being followed. Not following the rule of thirds will make your video look like amateur work right from the start. **If you only ever learn one thing about cinematography, this should be it.**

In an ECU (extreme close-up) the eyes usually are aligned with the top third, and the mouth along the lower-third.

Also, if your subject is looking off to one side or the other, they should be framed off-center such that there is more room in front of their face than behind it.

**Extended Image:** Amateurs tend to want to put their subject and any props (pictures on the wall, plants in the room, etc.) completely inside the shot. This includes the beginner's tendency to refrain from cutting off the top of any subject's head in a close-up, resulting in their eyes being centered in the frame, breaking the rule of thirds. But it's good to have things overlapping with the edge of the frame. It broadens the viewer's perception and takes them outside of the idea of a little box.



These peeps are out of the frame, but we can be sure that they are still intact!

### **Last but not least: Timecode**

A timecode is a sequence of numeric codes generated at regular intervals by a timing system. Timecodes are used extensively for synchronization, and for logging material in recorded media.

**Avoiding time code breaks:** Each frame of video is identified using a number called a timecode. When you edit video on your computer, the timecode identifies the exact places where you make edits. On your DV camera, a timecode indicator tells you how much video has been recorded on the tape. This indicator usually shows up in the camera's viewfinder or the LCD panel. A typical timecode looks something like this: 00:07:18:07. This number stands for 0 hours, 7 minutes, 18 seconds, and 7 frames.

Sometimes while recoding, there can be a timecode break. A timecode break is most likely to occur if you fast-forward or play a tape past a blank, unrecorded section and then start recording again.

When you capture video from a DV camera onto your computer, the editing software reads the timecode from your DV tape. If there is a timecode break, this can cause a problem when trying to capture your footage and edit it in a program such as Final Cut Pro.

So remember: **The best way to avoid timecode breaks is to refrain from shuttling the tape (fast-forwarding/rewinding/playing) between recording segments OR if you know that you want to review your tape throughout filming, record an extra 5+ seconds so that you can always stop the tape on recorded material.**