Camera Operator Primer

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Rule 1: Never ever shoot critical footage with the camera on automatic settings.

Automatic settings will **always** betray you. Your footage will be overexposed or underexposed, and your autofocus will always be locked on something other than your subject. If your shoot will be difficult or impossible to re-shoot, then you need to take control of the camera.

Depth of Field

Depth of field refers to the range of focus in a particular shot. A shallow depth of field means that your area of focus will be limited to a small region, and everything in front of and behind that region will move further out of focus that farther you go from your subject. Most professional productions make use of shallow depth of field because it makes their subject pop out from the background, and gives a more natural, pleasing look.

There are two methods to achieve a shallow depth of field: distance and aperture. The further the camera is placed from the subject, the more zoom is required to fill the frame. The tighter the zoom, the more pronounced the depth of field becomes. The wider the angle, the wider the depth of field.

The second method is to open the aperture or iris. A wider aperture (lower F stop) narrows the depth of field, while a narrower aperture (higher F stop) widens the depth of field. In bright shooting conditions, you can open the aperture and then adjust the camera's ND or neutral density filter to compensate for the exposure.

Focus

To set focus, zoom in on your subject, adjust the focus dial so your subject's features are sharp, then zoom out to frame your shot. As long as the distance from the camera to the subject doesn't change, your subject will stay in focus whether the zoom is wide or tight.

If your subject will be moving outside the field of focus, first adjust your focus for the subject's initial position and note the focus setting in the viewfinder. Then move your subject to their final position, adjust the focus on the subject, and note the focus setting in the viewfinder. Then when you film the shot, adjust the focus ring between the starting and ending reading.

If you will be filming a lot of motion, it is best to configure your camera for a wide depth of field and keep the zoom as wide as possible. You may need to move the camera closer to the action to accomplish this.

Exposure
The LCD on most digital cameras is not properly calibrated, and it is virtually impossible to set proper exposure when relying solely on the LCD. Most prosumer and professional cameras have a zebra feature that overlays stripes in the viewfinder. The stripes appear over areas of the shot that exceed a predetermined threshold of white.

I typically set my zebra threshold at 90-95%. You want to open the aperture or iris up to the point that the zebra pattern appears over any white elements in the shot. Zebras should usually not appear on skin, unless you are purposely going for an overexposed look.

When shooting a subject in the shadows with a bright background, such as a window, you either have to light your subject to balance the shaded area with the background, or you have to blow out your background by exposing for your subject. If you don't have the ability to light your subject, try to stage the shot so the subject is not in front of a bright background.

White Balance
The color temperature of light is measured in the Kelvin scale. The higher the temperature in Kelvin, the more blue the light is. Incandescent lighting usually runs about 3,000º Kelvin, while bright daylight can range from 9,500º up to 30,000º Kelvin.

When setting up a shot where the lighting has changed to any degree, it is important to manually white balance the camera. This adjusts the camera so white features in the shot appear white on the video.

To white balance the camera, light your subject, then place a pure white sheet of paper or cloth under the same lights with the subject. Zoom the camera so the white sheet fills the frame, then press and hold the white balance button until the camera adjusts to the temperature of the lights.

Framing
Most TV sets have an area of under-scan around the perimeter of the screen. That means that what you see in the viewfinder as you film will be cropped when viewed on a typical television. To compensate, you need to use TV-safe framing. Most prosumer and professional cameras have guides that can be displayed in the LCD and viewfinder to indicate action safe areas. If your camera doesn't have these guides, you want to frame your shot so that your subject(s) don't move further than 10% from the edge of the frame.

Panning

Try to avoid fast pans (side to side tripod motion) and tilts (up and down tripod motion). The faster the camera moves, the more you will see interlacing artifacts in your footage. Always try to stage your shot so you have a steady motion.

To achieve smooth pans and tilts, your best bet is a fluid head tripod. Professional tripods can run into the thousands of dollars, but the Bogen 501 and 503 series heads are only a couple hundred dollars and provide good fluid motion.

If a solid tripod is out of the budget, here's a trick to get more out of your cheap equipment. Tie the end of a large rubber band around the tripod handle, and then gently pull the rubber band to pan or tilt the camera. The rubber band will act as a shock absorber and the pan or tilt will be much more smooth. This technique takes practice, but with time, you can get fluid head results.

Zooming

As a rule, zoom should not be used during a shot. There are exceptions, and artistic license does come into play. Generally, however, shots should be static, or should only zoom in or out to follow the action.

Rather than zooming, you will get a much more cinematic look by dollying the camera. This involves either rolling the tripod, or hand-carrying the camera as smoothly as possible. When filming dialog shots, unless your subject is in motion, go with static shots with no zoom, and little or no motion.

Pre-Roll

When preparing to film a take, start the camera and allow it to run for 5-7 seconds before beginning the action. This allows time for the capture software to establish timecode and begin capturing the footage.