Sheela Ahmed

David Long

Intro to Imaging and Video Systems

11 May 2016

1. The first step after producing the color negative film is converting it into a master positive duplicate. This is primarily to protect the color negative film so that numerous copies can be made in the end without damaging the original. The process simply inverts all the colors on the color negative film, so most of the quality and detail is still present within the duplicate copy. The name is “master positive” because the original negative film is printed onto another negative film, and two negatives make a positive.

After the master positive comes the duplicate negative, which is the same process and uses negative film to take “pictures” of the master positive. The duplication negative is the step that allows for multiple copies of the film to be made because the material is much stronger. The material of the original camera negative film strip is made of natural polymers that are easily breakable, so creating multiple copies directly from the original would severely damage the film and the images. That’s the main reason for the extra steps of inverting the images onto stronger materials to make final copies that can be sent out to movie theaters without being damaged.

But for the duplication negative, there’s a chance of slight image quality loss. The difference isn’t severe but since the images are printed from the master positive – which is a copy of the original – the duplication negative is essentially “a copy of a copy”, which is similar to compressing a file multiple times: data is lost as each copy is made. The duplication negative isn’t copying directly from the original, and although the master positive is an inverted version of the original with all the detail and quality, it isn’t the exact same and therefore leads to minor loss in detail.

1. Since silver halide is natively sensitive to blue light, the color sensitive layer at the top of the film strip is the blue sensitive layer. So as an image comes in, all the information from the blue is gathered first so that all the blue photons can be absorbed by the first layer – which is a yellow dye to absorb the blue – and no other records are exposed to blue photons. After the blue sensitive layer is the green sensitive layer, which is primarily because green light is most important to sharpness. The V-lambda curve most closely associates with the green curve at each wavelength, so our eyes are most sensitive to green light. But the blue photons are absorbed first simply because silver halide is most sensitive to those. Once the green photons are absorbed, the red photons are the last portion left and so a red sensitive layer is placed underneath a gel interlayer separating each of the color sensitive layers. In terms of the film strip, red photons are the least important for absorption because our eyes are most sensitive to green and the silver halide is most sensitive to blue, which is why it is last in the order.

|  |  |  |
| --- | --- | --- |
|  | Magenta | Yellow |
| Scene Color | Magenta | Yellow |
| Incident Light | Red and Blue Layers | Red and Green Layers |
| Producing… | Cyan and Yellow dye | Cyan and Magenta Dye |
| In Printer, negative dye absorbs… | Red and Blue Light | Red and Green Light |
| Leaving Print Film Exposure in... | Green Layer | Blue Layer |
| Producing… | Magenta Dye | Yellow Dye |
| Which looks... | Magenta | Yellow |

1. The tungsten and daylight balanced forms of film are essentially for color temperature and white balance. Controlling the white balance ensures there are no unrealistic or unsettling tones in the footage captured and the human visual system attempts to correct for whites naturally, as if they were shown in daylight, especially when next to different backgrounds [1]. So if a white area is shown under tungsten light, our eyes will observe it as if it were in daylight, making it appear more orange than pure white.

In cinematography, failure to correct white balance can lead to whites look bluer and greener in daylight and redder in tungsten since tungsten light has a warmer tint and is associated with a color temperature around 3400K. Daylight is usually associated with a color temperature around 6500K and is bluer overall. So tungsten and daylight balanced films are made to help correct the white balance issues that can occur when filming. Tungsten film is balanced in a way where lighting is shown with a neutral color balance, so there isn’t any warm tint masking the whites. Daylight film would do the same but it would be used when filming outdoors so whites can actually appear white and not blue.

Using a tungsten balanced film outside would produce a much stronger blue cast because that film is balanced to eliminate the red, which means it will entail a bluer tint over the image. If the image already has a blue hue over it, another blue tint will amplify that hue. That is why both tungsten and daylight balanced films are necessary because whites can either have a cool tint or a warm tint, so it’s important to have resolutions for both issues. Tungsten light and daylight are the two most common lighting forms used in film so it makes sense that there are different forms of film that help balance the overall colors under those lights and make whites appear white with no tint or hue masking them.

1. Bleaching negative films is one of the last steps of image formation through subtractive color processing. When certain areas of the silver halide material interact with light, small centers of metallic silver form and when added to an oxidized color developer, the entire area becomes metallic silver. The area is surrounded by a dye, which is among the subtractive colors, and that dye needs to be isolated from the metallic silver so it can be used on the film. That’s when bleaching in utilized. The bleaching process converts the metallic silver area back to silver halide, and then through the fixer step, the silver halide area is removed. The fixer converts the silver halide into a water-soluble compound so it can easily be washed out of the film and leave the dye by itself.

The entire process of turning the silver halide area to metallic silver simply acts as a catalyst for creating the final color film, because the area is switched back to silver halide after dye is formed and then removed to create the final dye that forms the final color films.

1. The density values for Patch 1 are:

|  |  |  |
| --- | --- | --- |
| Red | Green | Blue |
| 0.30123 | 0.83075 | 1.12678 |

Patch 2:

|  |  |  |
| --- | --- | --- |
| Red | Green | Blue |
| 1.0311 | 1.63191 | 1.95729 |

Works Cited

[1] “Filmmaking: White Balance and Color Temperature”. Lights Film School. 2016. <https://www.lightsfilmschool.com/blog/filmmaking-white-balance-and-color-temperature/29/>