



USER GUIDE

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Introduction

Experienced photographers and professional television/video cameramen make creative decisions every day to manually control the settings of their cameras. That's what makes photography challenging and sets great photographers apart from mediocre photographers.

Knowing when to increase the exposure a stop or two, when to change the shutter speed, when to adjust the aperture, and when to change the ISO/gain, are just a few examples of creative decisions that you should rarely allow the camera to make automatically.

One very powerful creative tool that is often overlooked is white balance. Great photography (whether video or stills) is about communicating an emotion, and emotion is often largely determined by the colors of our images. And

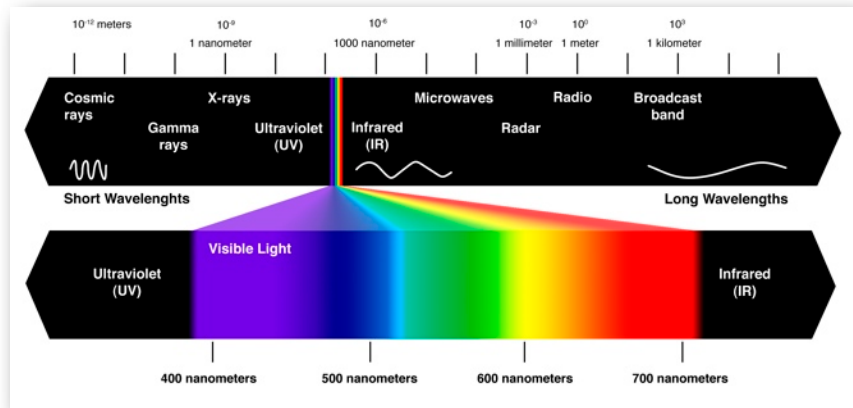


for that reason, attention to your camera's white balance becomes a critical part of the image capturing process.

Light and Color

The human eye is sensitive to a narrow portion of the electromagnetic spectrum where wavelengths fall between approximately 380 and 760 nanometers. This range of electromagnetic radiation is called the visible spectrum. To the human eye, each wavelength is viewed as a different color of light.

The reason we see objects with different colors is because each object has different light-reflection/absorption characteristics.



For example, a piece of white paper reflects almost all visible wavelengths and thus looks white. Similarly, a pure green object only reflects green light and absorbs all other colors.

Color Temperature

Color temperature is just a way of describing the color of a light source. It is measured in degrees Kelvin (K). Normal daylight has a relatively cool color temperature of around 5600K. Warmer light, such as an incandescent household light bulb, has a lower color temperature of around 3200K. So, our concept of warm and cool light is tied directly to its color temperature.

The perceived color of the objects we see around us largely depends on the color of the

light source under which they are being viewed. For example, outdoor daylight has a lot of blue in it, so objects will look bluer (cool). And indoor incandescent lighting has a lot red, so objects will look redder (warm). In other words, when objects are viewed under different lighting situations, they will

Type of Light	Color Temperature
Blue Sky	9000K
Cloudy Sky, Shade	7000K
Bright Sun, Clear Sky	6000K
Midday Sun	5600K
Sunrise, Sunset	4000K
Incandescent	3200K
Candle Flame	2000K

exhibit a color-cast towards the prevailing light source.

However, this concept is sometimes difficult for us to grasp because the human eye is very good at automatically adapting to changes in the color temperature of various light sources -- and therefore, the color of an object will usually look the same to us under any type of light source.

For example, since your brain expects a piece of copy paper to look "white", it automatically compensates for the color-cast of the current lighting so that the paper appears white.

But cameras aren't that smart. Even the most sophisticated camera cannot adapt automatically to the color temperature of various light sources with consistency and

precision. A camera can only make an educated guess as to whether you're shooting an object indoors, outdoors, at night, in shade, in bright sunlight, or even what the actual color of the object is.

White Balance

In order to obtain correct colors under different light sources, you must give the camera some help as it tries to figure out what the color temperature of the prevailing light is. That is known as "white balancing".

Basically you are telling the camera, "this object in the scene is supposed to be white", and then the camera will be able to calculate all the other colors based on that white reference.

Without getting too technical, the ratio between the red, green, and blue channels of the camera's output must be 1:1:1 to reproduce white as white.

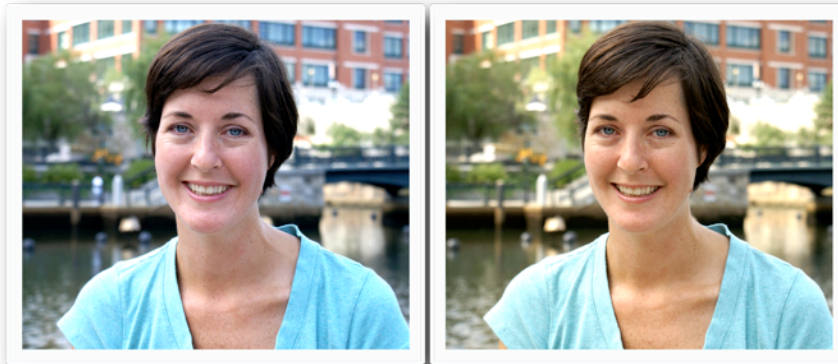
Therefore, if there is too much of one color of light illuminating the scene, then the camera must electronically compensate by adjusting the gain of each color channel to bring the 1:1:1 ratio back into balance.

So, regardless of the light source, when the camera's RGB output ratio is 1:1:1 a white object will look white and all the other colors



should look accurate. That's basically the whole purpose of white balancing.

Now, that sounds simple enough, but unfortunately it's not quite that easy because a technically perfect 1:1:1 color ratio rarely



produces pleasing images. Although getting a perfectly neutral white balance is sometimes required, it isn't very creative. Simply having the "right" white balance is not enough. You need to decide if you want to have an technically ACCURATE white balance or a CREATIVE white balance. Rarely do those two things occur at the same time in the real world.

For some reason, known only to the engineers who design them, HD camcorders and digital SLRs typically produce images that appear to be somewhat harsher and cooler than what our eyes perceive.

Even when the RGB ratio is correctly balanced at 1:1:1, the resulting image will almost always be too cool (especially for skin tones) and that in turn degrades the richness and vibrancy of all the other colors in the image. And that is unfortunate because in side-by-side comparisons, most people prefer the look of warmer, more saturated images.

An easy way of achieving the richer, warmer colors we desire, is to trick the camera into providing a white balance that is not balanced at 1:1:1. And that is the sole purpose of WarmCards – to fool the camera into giving you a modified white balance.

When you set your camera's white balance using one of the WarmCards, you are calibrating the colorimetry of the camera so that it starts at a baseline neutral setting (that matches the lighting conditions that exist at that place and that time) and then you are telling the camera to add a certain amount of

"warming" to the white balance so that you get the warmer, richer colors you desire.

For example, suppose you're outdoors and you use a normal ordinary white card to set the white balance on your camera. Let's say the camera measures the color temperature of the light striking the white card at 6000K.



Now, in the same situation, let's say you re-white balance the camera using the Warm 1 Card from your WarmCards kit instead of the white card. Now the color temperature

shown by the camera might read something like 6900K.

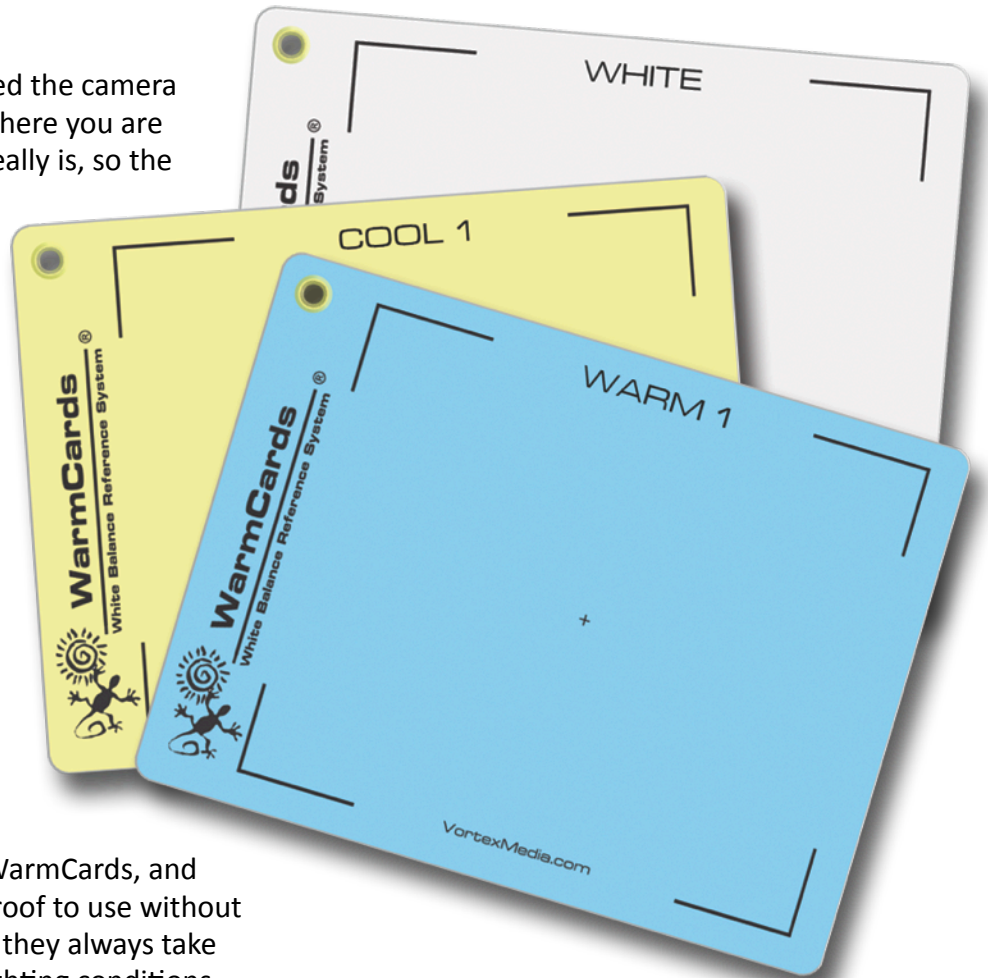
You have successfully tricked the camera into thinking the lighting where you are shooting is cooler than it really is, so the camera compensated by adding 900 degrees of warming to the image.

That 15% shift might not sound like much, but the change in your image will be very noticeable. In fact, if you're shooting a face, skin tones will look healthier and more pleasing no matter the age, race, or gender of the subject. It's that simple. WarmCards can turn ordinary shots into extraordinary shots.

The key to the success of WarmCards, and why they are nearly fool-proof to use without monitors or testing, is that they always take into account the current lighting conditions (whether you're indoors, outdoors, in shade, in bright sun, etc.) and then they add a little warming to whatever that prevailing color temperature is.

And with WarmCards, you can determine the amount of warming you want to apply by which WarmCard you choose to use: The Warm 3 Card will add the most warming; the Warm 2 a little less; and the Warm 1 will provide the mildest effect.

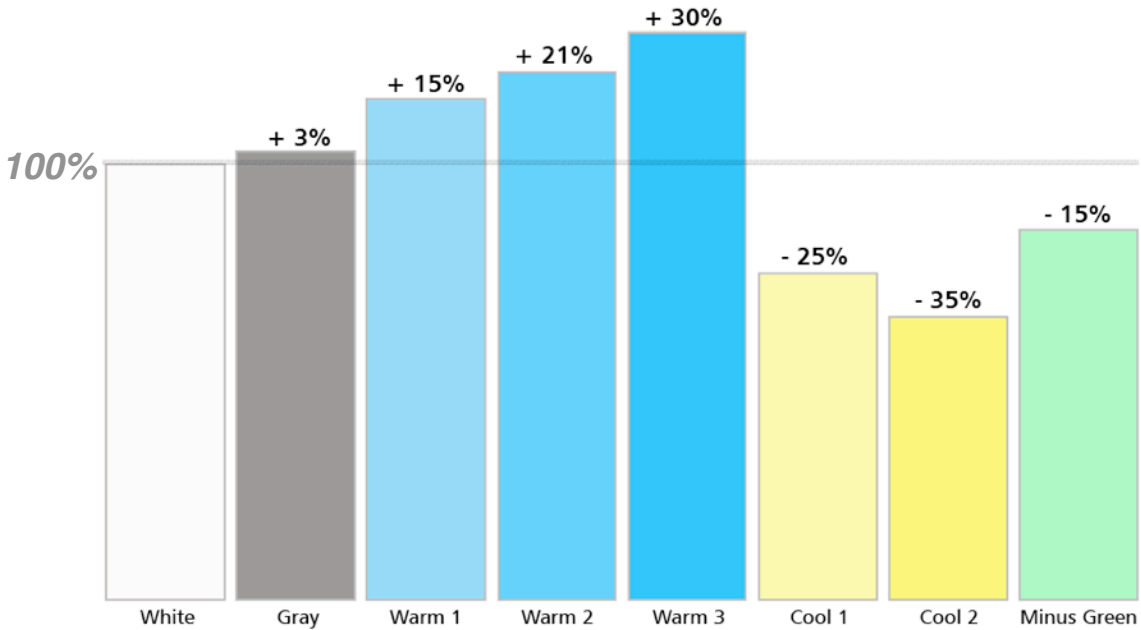
But that's not all, even the Digital Gray Card will provide a little bit of warming if you only want a very slight color shift.



Ultimately, the choice of which WarmCard to use at any given time is purely a matter of personal taste and style. There are no right or wrong choices.



Relative effect of using each card:



Comparison was performed with a Sony PDW-F800 XDCAM HD camcorder, using color correction filter C, and the Standard Scene File, shooting under daylight balanced fluorescent lighting. Similar tests, using other Scene Files and camera settings, generally produced results that only varied by 1-2% from these numbers.

In the graph above, you can see the relative amount of warming or cooling that each card provides – as compared to the provided White Card.

Keep in mind that the numbers in this chart are only approximations and the actual effect that each card provides will depend on several factors including the model and brand of camera, the color temperature of the

prevailing lighting source, the camera’s Scene File or Picture Profile settings, any filters that are on the lens, and more.

In the chart below, you can see the actual color temperature that the PDW-F800 measured for each card -- plus the Red Gain and Blue Gain values, which are critical components of the “look” of the white balance.

CARD	COLOR TEMP	C TEMP BAL	R GAIN	B GAIN
WHITE	5154	2	12	-7
GRAY	5303	3	16	-8
WARM 1	6120	8	27	-11
WARM 2	6764	6	31	-18
WARM 3	7923	12	44	-19
COOL 1	3741	12	0	25
COOL 2	3235	28	0	57
MINUS GREEN	4364	29	25	34

About The Cards

WHITE:

This card serves as an ideal white reference when no warming or cooling is wanted. It reflects all colors of the spectrum nearly equally, and can consistently do so under a broad range of color temperatures.

In fact, we will go so far as to say that our White Card is superior to other white cards. All whites are not created equally. Our White Card is about 2% warmer than the industry-standard PortaBrace white card; about 7% warmer than a Kodak Gray card; about 3% warmer than a Delta Gray card; and even about 2% warmer than ordinary copy paper.

DIGITAL 18% GRAY:

This card can be used to serve two purposes: Exposure and white balance. First, as a white balance reference, it provides a very nice, yet subtle amount of warming – about 3% warmer than the White Card. So, if you only want very slight warming, use this card.

As an exposure tool for still photographers (generally not used for video), the Digital 18% Gray Card can provide a standard reference object for setting exposure. Traditionally, an 18% gray card is used together with a reflective light meter, as a way to produce consistent image exposure for still photography. Our Gray Card can be used as a rugged, nearly indestructible alternative to cardboard gray cards.

WARM 1:

Out of the three WarmCards included with your kit, this one provides the least amount of warming. It shifts the color temperature about 15%. Use this card when minimal warming is desired.

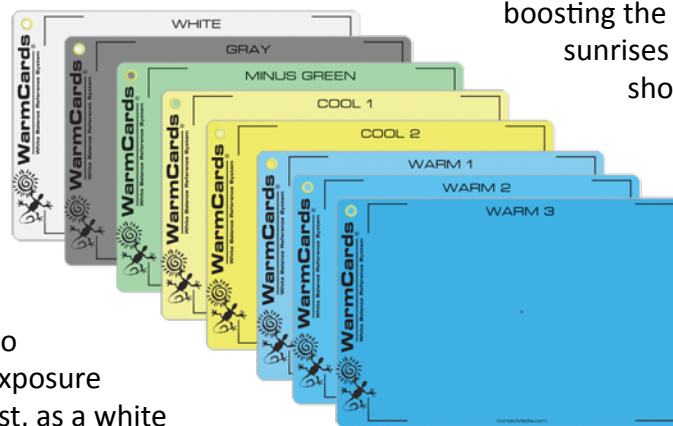
WARM 2:

This card shifts the color temperature about 23% and is highly recommended for head shots, video interviews, and portrait photography.

WARM 3:

This card provides the maximum amount of warming and shifts the color temperature about 36%. This card is great for boosting the warmth of sunsets, sunrises or other outdoor shooting situations.

Since all cameras behave a little differently, we recommend that you experiment with the card, using your own camera equipment, to see what effect it has on skin tones before using it without a field monitor or computer screen.



COOL 1:

Sometimes the use of a WarmCard won't result in the right "look" that you want to capture in your images. Sometimes cooler is better. This card can be used to create a white balance that is about 28% cooler than normal.

COOL 2:

When even more cooling is desired, this card reduces the color temperature by about 38%.

MINUS GREEN:

Cheap fluorescent lighting usually has a greenish cast to it - thus, distorting colors and making people look unhealthy. This is a common problem at places such as factories, airports, schools, retail stores, office buildings, supermarkets, car dealerships, and hospitals. A "normal" white balance will not compensate for the green tint of these kinds of lights. White balancing with the Minus Green Card counteracts the greenish tint caused by fluorescent lighting and reproduces colors with more accuracy – without any warming. If you want warmer tones, then use Warm 1, Warm 2, or Warm 3 because those cards will reduce the green tint and warm the picture at the same time.



How to set a custom white balance with a WarmCard:

Using WarmCards is every bit as easy as white balancing on a white card. Just aim the camera at the WarmCard, follow the steps to set a custom white balance on your model of camera, and you're ready to start shooting.

The specific techniques of setting a manual white balance vary from camera to camera and are beyond the scope of this User Guide,

however here are some general directions that you may find helpful.



Professional Video Camcorders:

1. If your camcorder has a Color Correction filter wheel, be sure to put it on the setting that comes closest to the color temperature of the lighting where you'll be shooting. The purpose of the filter wheel is to place a colored glass filter in the path of the incoming light, and thus take some of the workload off the camera's electronics of adjusting the color. The filter puts the color temperature in the right ballpark, and then white balancing fine-tunes the settings.
2. Choose the A or B position on the white balance memory switch. Do not select Preset, Auto-White Balance, or ATW.
3. Position the WarmCard so that it is under the same lighting as the subject you'll be shooting. In a typical interview situation or studio portrait, where the lighting is very targeted on the subject, you'll want to have the person hold the card near their face or chest.

4. Zoom in and fill the whole frame with the WarmCard. Anything less than full-screen may result in an improper white balance. Make sure that the card is held steady, and that it is angled as necessary to avoid unwanted reflections.
5. Set the iris to automatic mode or adjust the exposure manually to obtain a mid-level exposure. If the exposure is drastically off one way or the other, the camera may not be able to execute the white balance function.
6. Press the camera's White Balance button. After a few seconds, the camera should show you a message in the viewfinder telling you that the white balance has completed successfully.
7. The camera will retain this white balance until another white balance is performed. If lighting conditions change or you move to a new location, you should set a new manual white balance using the same card.



Nikon digital SLRs:

1. Position the WarmCard so that it is under the same lighting as the subject you'll be shooting.
2. Set the camera's exposure mode to Aperture Priority or Shutter Priority.
3. Go to the White Balance menu and highlight "Preset Manual", and then press the right arrow button on the multi-selector. Now you've got two choices: "Measure" and "Use Photo". If you choose "Use Photo" it will defeat the whole reason for setting a custom white balance. You'll always want to choose "Measure" so that the white balance is set to match the current lighting conditions.
4. After selecting "Measure", choose "Yes" to confirm that you want to overwrite the previous white balance setting.
5. Fill the viewfinder with the WarmCard by zooming the lens or moving the camera closer to the card.
6. Press the shutter release button. No photo will be taken, but the camera will measure the color temperature of the light striking the card and adjust the white balance to match it perfectly.
7. If the camera was able to get a good white balance you'll see a confirmation message on the LCD panel, and now you're ready to start shooting.

Canon digital SLRs:

1. Position the WarmCard so that it is under the same lighting as the subject you'll be shooting.
2. Set the camera's exposure mode to Aperture Priority or Shutter Priority.
3. Fill the viewfinder with the WarmCard by zooming the lens or moving the camera closer to the card.
4. Press the shutter release button and take a photo of the card. In the next steps, that photo will be used as a reference to calibrate subsequent photos.
5. Press the Menu Button and go to the Shooting Menus and select the Custom White Balance menu.
6. The picture that comes up first on the LCD should be the one you just took, but if not, navigate until you find it.
7. Press the Set button, highlight OK, and press the Set button again. Now that image's white reference data is analyzed by the camera to calibrate the white balance setting. Start shooting.

