

# expodisc

Professional Digital White Balance

## *Forward*

Thank you for purchasing an ExpoDisc.

The ExpoDisc was originally designed by my late grandfather George A. Wallace as an incident exposure and printing tool for use with 35mm SLR film cameras. But the advent of the digital imaging revolution created an entirely new application for the ExpoDisc by enabling photographers to quickly and easily manage their color at capture.

By now you already know that today's Digital SLR cameras frequently do not reproduce accurate color when presented with difficult real world lighting challenges. While many cameras perform admirably in white light conditions, less ideal conditions, (e.g., tungsten, fluorescent, shade or stadium lighting) frequently require additional efforts be taken to consistently deliver accurate color.

Factory defined white balance camera presets simply do not account for the multitude of real life lighting variables found in almost every scene. And Auto White Balance is too limited and inconsistent for most professional photographic applications.

Knowing the limitations of reflective metering, digital camera manufacturers allow for photographers to measure, and correct for the color of incident light illuminating their subjects through the custom white balance procedure.

A photographer using an ExpoDisc to set a custom white balance can quickly and easily measure the color of incident light, and, in the process, provide his camera with the information it needs to consistently capture and reproduce beautiful, accurate color.

From macro to telephoto to panoramic shooting applications, in studio, under tungsten, in open shade and in mixed light environments, the ExpoDisc is simply the quickest and easiest way to set a custom white balance.

We welcome you to visit our website at [www.expoimaging.net](http://www.expoimaging.net) for more information on the ExpoDisc as well as other ExpoImaging products. There you will find updates on cameras, additional instructions and helpful tips from the pros, not to mention a bit of very colorful history on my grandfather George Wallace.

We hope you enjoy your ExpoDisc experience and welcome your feedback.

Sincerely,  
Erik Sowder  
President  
ExpoImaging, Inc.

## TABLE OF CONTENTS

### 1. Getting Started

- 1.a. Introduction
- 1.b. What is a Custom White Balance
- 1.c. Neutral Filter vs. Portrait Filter (Warm Balance)
- 1.d. Custom White Balance for Digital Video
- 1.e. Overview of How to Set a Custom White Balance with the ExpoDisc
- 1.f. Installation of the ExpoDisc
- 1.g. Correctly Exposing the Custom White Balance Capture
- 1.h. Where to aim the Camera for the Custom White Balance Capture
  - 1.h.1. Ambient/Mixed Lighting
  - 1.h.2. Landscape Photography
  - 1.h.3. Studio Lighting
  - 1.h.4. Direct On-Camera Flash
  - 1.h.5. Wireless On-Camera Flash
  - 1.h.6. Bounced (Reflected) On-Camera Flash
- 1.i. Using the ExpoDisc with Other Camera Filters
- 1.j. White vs. Gray For Custom White Balance Reference
- 1.k. Poor Color Saturation

### 2. Advanced Users

- 2.a. Checking for Dust on the Digital Imaging Sensor
- 2.b. Applying an ExpoDisc Custom White Balance Post-Capture
  - 2.b.1. Creating A Gray Frame Reference
  - 2.b.2. JPEG Post Process White Balance Correction
  - 2.b.3. Camera RAW Post Process White Balance Correction
- 2.c. Using a Custom White Balance to Create Warming and Cooling Effects
- 2.d. Metering for Exposure with the ExpoDisc
  - 2.d.1. Front-lit subjects
  - 2.d.2. Side-lit subjects
  - 2.d.3. Back-lit subjects

### 3. Troubleshooting

- 3.a. Camera and Hardware Specific Issues
- 3.b. Camera Rejects the Custom White Balance Reading
- 3.c. Correcting for Colorcasts
- 3.d. Photographing in Mixed Light

Copyright Notice  
Limited Warranty

## DIGITAL INSTRUCTIONS

### 1. Getting Started

#### *1.a. Introduction*

Thank you for purchasing the ExpoDisc. You are in possession of the finest “front-end” white balance device for your color-managed workflow. Please treat the ExpoDisc as any other fine optical instrument. When not in use, store the ExpoDisc in a dry, dark place to ensure many years of use.

Before using your new ExpoDisc Neutral or Portrait Filter, please consult your camera manual for specific instructions on how to set a custom white balance. To help you get started, the Appendix contains step-by-step instructions for many DSLR cameras.

The following instructions apply to both the Neutral and Portrait ExpoDisc custom white balance filters. The Neutral Filter will neutralize, or color balance the image file, while the Portrait Filter will first neutralize the image, then warm it with a subtle red cast ideal for skin tones.

**IMPORTANT:** Do not point your camera directly at the sun without the ExpoDisc installed. Direct sunlight may damage or destroy your camera’s image sensor.

#### *1.b. What is a Custom White Balance*

Even the best digital cameras are incapable of consistently delivering accurate color without the user performing a custom white balance. Auto (AWB) and preset white balance functions often produce maddeningly inconsistent results.

Recognizing the importance of custom white balance to good color, digital camera manufacturers have designed their cameras to take advantage of a custom white balance. A custom white balance procedure captures, or samples the light with an exposure, or reading of the light. An ExpoDisc custom white balance effectively calibrates the camera to the color temperature of light to which the disc is exposed.

After following this procedure the white balanced camera neutralizes a colorcast by amplifying the deficient red, green, and/or blue color channels to bring them into balance with the highest value of red, green or blue appearing in the reference image. Thereafter, the camera will add the same quantities of red, green and blue to any pictures taken while the camera remains on that same custom white balance setting. The result of using a custom white balance is balanced, accurate color.

#### *1.c. Neutral Filter vs. Portrait Filter (Warm Balance)*

The Neutral ExpoDisc is designed to pass equal amounts of red, green and blue light through to the camera’s image sensor. The result of using the Neutral ExpoDisc to set a custom white balance is balanced color -- white whites and gray grays.

Designed specifically for portrait photographers, the ExpoDisc Portrait Filter enhances and accentuates healthy skin tones. Rather than producing an image file with neutral whites, the Portrait filter first neutralizes, then enhances the whole image with a warming effect. The ExpoDisc Portrait Filter effectively adds subtle, pleasing red tones and highlights to the hair and skin.

#### *1.d. Custom White Balance for Digital Video*

The ExpoDisc is an excellent white balance tool for use with digital video cameras. Simply install the disc and follow your camera's custom white balance procedure. The instructions for where to point your video camera are the same as for still cameras (see section 1.h. Where to Aim Your Camera). You must set a different custom white balance for each change in lighting.

#### *1.e. Overview of How to Set a Custom White Balance with the ExpoDisc*

Install the ExpoDisc on the end of the lens and follow your camera's custom white balance procedure to take an exposure or reading through the disc. A custom white balance can easily be set in any of the auto exposure (AE) modes, such as the "P", "S", or "A" mode, or in the manual exposure "M" mode.

Under most conditions it is best to aim the camera towards the light source, as if you were using an incident light meter to take the exposure or reading through the ExpoDisc. Set your focus to manual if your camera will not release the shutter with the ExpoDisc installed. Save or select the exposure, or reading ('capture') for your custom white balance setting. This procedure must be repeated for each change in lighting.

The following sections provide additional in-depth information about each of the steps involved with setting a custom white balance using the ExpoDisc.

#### *1.f. Installation of the ExpoDisc*

Insert the ExpoDisc into the threaded recess in front of your camera lens with the plain white side facing the camera. To remove the ExpoDisc, simply reverse this action.

#### *1.g. Correctly Exposing the Custom White Balance Capture*

Whether photographing in the manual exposure "M" mode, or one of the auto exposure "AE" modes, the custom white balance capture should be taken with correct exposure settings for the shot. Failure to do so may result in the inability to set a correct white balance.

Your white balance capture will be automatically exposed correctly if you use the camera's auto exposure (AE) settings, such as the "P", "S", or "A" modes.

When using the manual exposure "M" mode, set the custom white balance with a properly metered exposure. Shoot the custom white balance capture at the same exposure setting as was metered for the shot.

1. Take an incident flash-meter reading (or equivalent) to get a correct exposure.

2. Set the indicated exposure with the camera in the “M” manual exposure mode.
3. Take an exposure, or reading through the ExpoDisc to set the custom white balance. (See 1.f. Where to Aim the camera.)

If your camera does not capture an image in the custom white balance procedure, e.g. Nikon cameras, then you may want to take an additional exposure through the ExpoDisc to examine its histogram.

Examine the in-camera histogram of the ExpoDisc image file to verify the exposure is not clipped in either the highlight or shadow areas. If the histogram appears acceptable, then you have an acceptable exposure for custom white-balance purposes.

Note. Setting a custom white balance under strobe illumination at an exposure setting other than that with which you will photograph your subject may produce an incorrect white balance and colorcast. The difference in exposure could alter the ratio of ambient light to strobe light, which would effectively change the color temperature of your custom white balance exposure.

### *1.h. Where to Aim the Camera for the Custom White Balance Capture*

Using the ExpoDisc to set an accurate custom white balance requires the light illuminating the subject to pass through the ExpoDisc to your camera’s image sensor. This is easily accomplished in studio, under ambient light, and in certain on-camera flash applications. Point the camera towards the main light source in studio, or under ambient light in a direction that will capture the direct and reflected light illuminating the subject for the custom white balance capture.

#### *1.h.1 Ambient/Mixed Lighting*

Point the camera in a direction that allows the light you wish to balance (the light illuminating your photographic subject) to strike the front of the ExpoDisc. In other words, stand in similar lighting as your subject and point the camera back towards the position from which you will take the picture. Using this technique will allow you to balance the average color temperature of ambient light illuminating your subject, including light reflected off nearby surfaces, e.g. green lawn, red brick patio, brightly colored walls, etc.

#### *1.h.2. Landscape Photography*

Although the ExpoDisc is an incident tool, the landscape photographer will find it invaluable in correcting for extreme lighting conditions, e.g. snow scenes, high elevations, early evenings, etc. Because a landscape photographer’s subject is a vista encompassing many color temperatures of light, it is impossible to balance to a single light source. Therefore, it is best to balance to the scene itself, by aiming the camera towards the scene to be photographed. This technique allows the camera to establish an average color temperature for the scene, and to preserve the varying shift in warmer and cooler tones throughout the scene.

### *1.h.3. Studio Lighting*

When using color balanced studio lighting, go to subject position and aim the camera into the main light source for your custom white balance reading. You may need to aim the camera back towards the tripod position if correcting for unbalanced illumination, i.e. your lights do not emit the same color temperature light. Note, the strobe must fire to set your custom white balance.

### *1.h.4. Direct On-Camera Flash*

When using a flash unit mounted to the camera, you may get inconsistent results aiming your camera and flash directly at the subject for your custom white balance capture. If the color temperature of light coming from behind the subject is substantively different than your daylight balanced flash illuminating the front of the subject, then the overall white balance reading may shift. For example, indoor illumination is frequently warmer in color than daylight balanced strobes. If the white balance capture is taken by aiming the camera at the subject, then a subject backlit by warm tungsten light will signal the camera to compensate and amplify the blue color channel. This may result in a bluish colorcast on the subject.

Photographing in ambient light that is a similar color temperature to your camera-mounted flash unit can yield acceptable results. For example, photographing in daylight using daylight balanced strobes (5500K color temperature).

### *1.h.5. Wireless On-Camera Flash*

If you are illuminating the subject with direct on-camera flash, and the flash unit can be removed and remotely fired, then remove the flash and place it at your intended shooting position. Then take your camera to your subject's position and point the camera back towards the flash unit to take your white balance reading. Note, the flash must fire when taking the white balance capture.

### *1.h.6. Bounced (Reflected) On-Camera Flash*

If utilizing bounce flash to illuminate your subject, then point the camera and flash towards the bounce surface (e.g. ceiling) for your custom white balance capture. Note, avoid aiming the camera towards a ceiling light.

You may get acceptable results reflecting the flash off a neutral, or near neutral surface back towards the camera for the custom white balance capture. Note, non-neutral surfaces will change the color of light they reflect. This may introduce a colorcast into the image.

Bouncing the flash off a silver backed mirror may also produce acceptable results, but mirrors with warmer or cooler tones may alter the light reflected back and affect the results.

Whether bouncing flash off ceilings, walls, or mirrors, the degree to which the bounce surface affects the results depends on the color of the surface itself. The closer the surface is to neutral, the more accurate the color will be.

### *1.i. Using the ExpoDisc with Other Camera Filters*

The ExpoDisc generally can be installed and used as intended over other camera filters, such as skylight, UV, or polarizing filters. Some users have experienced inconsistent results when using the ExpoDisc with a UV/IR ‘cut’ filter, however.

Note that any color introduced by filters combined with the ExpoDisc during the custom white balance procedure will be neutralized (unless the color temperature is outside the range of your camera’s capabilities, see Poor Color Saturation 1.j. below)

### *1.j. White vs. Gray for the Custom White Balance Reference*

Digital cameras require a neutral surface, white or gray, to set an accurate custom white balance. But while both white and gray may produce an accurate white balance, a middle gray value is easier to use and more desirable. This is because a middle gray medium reduces unwanted reflectivity and the danger of overexposure, problems frequently associated with use of bright, white surfaces. As such, the calibrated neutrality and light density (18% gray) of the ExpoDisc make it an ideal white balancing tool. Therefore, even if your camera’s manual specifies the use of a white reference, the ExpoDisc will function correctly with your camera.

### *1.k. Poor Color Saturation*

The ExpoDisc works by alerting the camera’s white balance sensors to color(s) that need to be increased in order to achieve a neutral balance. Most digital cameras can establish a correct white balance when the source light is in the range of 2800° to 9500° degrees Kelvin. Your camera may not be able to set a white balance when the color of the source light is outside this range, or it may display a warning message such as ‘over’, ‘under’, or ‘out of range’. In some cases, either the maximum or minimum color temperature will be used as the white balance, which may result in a color cast in your pictures.

## *2. Advanced Users*

### *2.a. Checking for Dust on the Digital Imaging Sensor*

To check for dust on your DSLR’s digital imaging sensor, simply install the ExpoDisc, place the camera in aperture priority mode and set the aperture to f16. Put the camera in manual focus mode, aim at any light source, zoom out and focus on infinity. Press the shutter release to capture a dust reference frame.

If you see dust spots on the dust reference image, then you need to clean your camera’s imaging sensor. Consult your camera’s manual for proper instructions.

### *2.b. Applying an ExpoDisc Custom White Balance Post-Capture*

When used as described in Sections 1.d through 1.j, your digital camera will record an ExpoDisc custom white balance with JPEG and RAW image files when you shoot. This is critical with JPEG files since white balance is applied at the time of image capture and adjusting for incorrect white balance is difficult, if not impossible, post-capture.

A white balance recorded at capture with RAW files is also extremely convenient since the RAW files will be imported with an accurate 'As Shot' white balance. Although the ExpoDisc excels at performing in-camera white balance, it can also be used effectively to set white balance post-capture.

#### 'As Shot' White Balance Applied to RAW Images Post Capture

Unlike JPEG files, RAW image files store white balance data separately from other image data, allowing you to apply any one of multiple white balance settings post-capture. You can easily apply your ExpoDisc white balance taken at capture to RAW images as the 'As Shot' or 'Shot Settings' white balance.

If, while capturing your images in RAW, you took a custom white balance reading with the ExpoDisc and applied that reading to each image using the procedures described in Sections 1.d through 1.j, each image will have the ExpoDisc custom white balance assigned to the 'As Shot' white balance setting for that image. When the image is opened in your RAW image manipulation plug-in or program, (e.g., Adobe Photoshop® RAW plug-in, Nikon® RAW Plug-in, Nikon Capture®, Canon® RAW Image Converter, Apple Aperture®, Adobe Lightroom®, etc.) the 'As Shot' option in your RAW image software will refer to the ExpoDisc custom white balance recorded with that image. Therefore, when you open your RAW image file, just select the 'As Shot' option and your image will open with your ExpoDisc custom white balance applied. You can evaluate your ExpoDisc custom white balance to other white balance presets (e.g., Sunlight, Fluorescent, Tungsten, etc.) by selecting one of those options and comparing it to the 'As Shot' ExpoDisc custom white balance.

#### Click Balance: Post-Capture White Balance Application Without Applying a Custom White Balance In Camera at the Time of Shooting

The ExpoDisc can also be used to create white balance reference frames which can later be applied post-capture in Adobe Photoshop®. Although in most situations it is advantageous to apply a custom white balance at capture, it is possible to record a custom white balance capture, take multiple shots without applying that reference in camera, then apply that custom white balance reference post-capture in Photoshop®. This post-capture white balance application is commonly called 'click-balancing'.

Sections 2.c.1 through 2.c.3, which describe a post-capture 'click-balance' procedure for the ExpoDisc, were graciously contributed by photographer Peg Jackson. Whether you will be shooting JPEG or RAW, shoot your images and create a gray frame reference using the procedures described in Section 2.c.1. Then, follow the procedure outlined in 2.c.2 if you are shooting JPEG or the procedure in 2.c.3 if you are shooting RAW. By 'click-balancing' using Peg Jackson's method, you will apply your ExpoDisc custom white balance reference frame to images post-capture.

##### *2.b.1. CREATING A Gray Frame Reference for Post Process*

Set your camera's white balance preset control to match the dominant light source in the scene, e.g. use 'Daylight' if it's sunny, 'Cloudy' if it's overcast, 'Tungsten' for incandescent lighting, 'Fluorescent' for fluorescent, etc. and, following the procedures for using the ExpoDisc, capture an image, or reading. This will record a "gray" frame

reference that documents the color of the light where the exposure is made. Shoot your pictures using the same white balance preset.

Note that the ExpoDisc Gray Frame Reference is only truly gray if you aim the camera towards white light; it will appear blue if you aim the camera towards blue light, and orange if you aim the camera towards yellow light, etc. This colorcast is what the camera or software neutralizes in the white balance procedure.

You may also notice slight variations in color by clicking on different areas of the gray frame. These variances in the RGB values may result from a combination of image processing, lens fall-off, dust contamination, sensor imperfections, or artifacts introduced by compression programs including conversion of files to other formats such as JPEG. To minimize the possibility of encountering such variations, your eyedropper tool sample size should be set to 3x3 or 5x5. To set the sample size select the eyedropper tool in the Tools palette and change the sample size on the Option bar.

#### *2.b.2. JPEG Post Process White Balance Correction*

1. Open the Gray Frame Reference in Adobe® Photoshop® and open the photo you want to correct, so you have both images side by side. Click on the Gray Frame image to make it active.
2. Click on the New Adjustment Layer icon at the bottom of the Layers palette.
3. Click on Curves.
4. The Curves dialog box will open. Click on the Gray eyedropper, and then click on the Gray Frame reference image. This will neutralize the color. Click OK. You'll see the Curves Adjustment Layer above the Background Layer in the Layers palette.
5. By looking at the Info Palette you can see that the RGB values are equal and the color is neutralized.
6. Now, the fun part! Click on the Curves Adjustment layer in the Layers Palette, hold down the mouse button and drag the Adjustment Layer onto the photo you want to correct. This applies the neutral adjustment layer, ie. The White Balance, to the photo. You'll see the Curves Adjustment layer over the Background layer in the Layers Palette.
7. You can click and drag the Curves Adjustment Layer to the rest of your images taken under the same lighting conditions, or use the Batch feature to apply the adjustment to all the images in the folder.

#### *2.b.3. Camera RAW Post Process White Balance Correction*

1. Open the Gray Frame Reference in Adobe® Camera Raw.
2. Settings should be set to "Camera Default" and White Balance to "As Shot".

3. When the RGB values at the bottom of the screen are within a point or two of each other the white balance is nearly perfect. When the numbers are significantly different the image has a colorcast. Equal numbers mean a perfectly neutral White Balance.
4. If the RGB numbers don't match, then click on the White Balance Tool (the eyedropper) and then click on the Gray Frame Reference. This will neutralize the color, and the RGB values will now be equal. Click OK.
5. Open the next photo in Camera Raw. Instead of "Camera Default" change the setting to "Previous Conversion". This will apply the neutral White Balance setting established by the Gray Frame Reference.
6. Adjust the Exposure and Shadow settings for the photo, and click OK. You can open the rest of your images taken under the same lighting conditions using "Previous Conversion" individually, or use the Batch feature to apply these settings to all the images in the folder.

"Many professional labs will do color correction for you, and they can only give you the best quality prints from image files that are properly exposed and require little color correction. Using the ExpoDisc will help ensure both consistency and neutrality."

*-Peg Jackson.*

### *2.c. Using a Custom White Balance to Create Warming and Cooling Effects*

You can modify your ExpoDisc custom white balance by placing a colored filter over the front of the ExpoDisc during the custom white balance procedure. This will create a custom color profile that adds a colorcast inverse to the color of the filter placed in front of the ExpoDisc. For example, using a yellow filter in front of the ExpoDisc will create a cyan cast to all images to which that custom white balance is applied. Note that the warming and cooling filters are used only when the custom white balance captures are made. The actual photo is shot without any colored filters.

In this fashion, the ExpoDisc can be used with Kodak Wratten Series warming and cooling filters to provide the traditional look of film warming and cooling with digital capture.

For a warming series, shoot balance captures with the bluish 82, 82A, 82B and 82C filters. When the custom white balance procedure removes the excess blue of these captures to normally exposed images, the compliment of the 82 series will be "applied" to the normally exposed images, thereby resulting in 81, 81A, 81B or 81C warming effects.

For a cooling effect on your normally exposed images, shoot balance captures with the warm looking 81, 81A, 81B, and 81C filters. When the custom white balance procedure removes the excess warming effect of these filters, the compliment of the 81 series will be applied to the normally exposed images, thereby resulting in an 82, 82A, 82B or 82C cooling effect.

## ***2.d. Metering for Exposure with the ExpoDisc***

Today's digital SLR cameras capture an image with a similar dynamic range as yesterday's Kodachrome 64 color slide film, for which the ExpoDisc was originally designed. The method for using the ExpoDisc as an incident exposure tool was initially developed to compensate for the limited dynamic range of the capture medium. The result is a tool that requires decisions over whether to expose for highlights or shadows in high contrast lighting, and to make adjustments as necessary. When used correctly, you should expect to be within 1/3 stop of correct exposure.

### ***2.d.1. Front-lit Subjects***

This category includes all front-lit and uniformly-lit subjects and scenes in which there are no significant highlight or shadow areas.

1. Stand in the same lighting as your subject (although not necessarily beside it) and put your camera in its manual exposure mode and mount your ExpoDisc in front of the camera.
2. Then point the camera and ExpoDisc in the direction directly opposite that in which you will be shooting to make the exposure.
3. Turn on the camera meter, adjust the aperture and/or shutter speed settings until the camera meter indicates good exposure conditions.
4. Return to your shooting position (if you left it to do your metering) and remove the ExpoDisc from in front of the camera lens.
5. Aim the camera, check the framing, and shoot.

### ***2.d.2. Side-lit Subjects***

These include all subjects and scenes in which there are significant highlight and shadow areas, and in which the highlight areas are most important.

Follow the procedure described for photographing front-lit subjects, but after pointing your camera and ExpoDisc directly away from the subject and before adjusting the exposure settings, swing the camera and ExpoDisc about one-third of the way towards the main light source.

### ***2.d.3. Back-lit Subjects***

This category includes all subjects and scenes in which there are significant highlight and shadow areas, and in which the shadow areas are most important.

Follow the procedure described for photographing front-lit subjects, but just before clicking the shutter, reduce the exposure one full stop, to provide for appropriately darker-than-normal image tones in the shadow areas.

## ***3. Troubleshooting***

### ***3.a. Camera and Hardware Specific Issues***

Check the camera's instruction manual to ensure you are correctly following the custom white balance procedure. Simple procedural errors frequently lead to inconsistent results and colorcasts. User defined camera settings can also affect results, such as color, tone and hue. Firmware updates, monitor calibration and print settings should also be considered and evaluated when troubleshooting color problems.

### *3.b. Camera Rejects the Custom White Balance Reading*

If a digital camera takes a reading without taking an exposure (e.g., Nikon, Fuji, etc.) in the custom white balance procedure, then the camera may reject the reading (No Good) if the custom white balance capture is over, or under exposed. If this rejection occurs, then adjust the exposure and repeat the custom white balance procedure until the camera accepts the reading.

The camera may also reject the custom white balance reading if the color temperature of light is outside the range and capability of the camera to balance (No Good, Over/Under Error). See 1.k. Poor Color Saturation. Modify the color temperature of light to bring it within the specified custom white balance range of the camera.

### *3.c. Correcting for Colorcasts*

Because the ExpoDisc is a professional tool it must be treated like any other professional tool, with a proper respect of what it can do when used properly, and what can result if used improperly.

Taking a picture with an improper white balance will yield an undesirable colorcast. Red, Green, Blue, Cyan, Magenta or Yellow colorcasts may result from improper use of the ExpoDisc. Most colorcasts result from improperly aiming the camera while setting the custom white balance, or from failing to properly follow the camera's custom white balance procedures.

In general, a bluish colorcast will appear in the image if the custom white balance capture incorporated warmer light than that which illuminated the subject at the time of image capture. Conversely, a red or yellow colorcast will occur if the custom white balance was set to a cooler light source than that which illuminated the subject at the time of image capture.

### *3.d. Photographing in Mixed Light*

White balance settings are stored as color temperatures, and digital cameras are limited to setting a single white balance color temperature for any given shot. Using an ExpoDisc, a photographer can set a single white balance to an average color temperature of two or more divergent light sources. However, an individual light source may still dominate the color of light illuminating particular portions of an image. To the extent that any portion of an image is illuminated by light that differs from the camera's set white balance, that portion may show a colorcast.

In a diffused mixed light environment, aim the camera in a direction that will expose the ExpoDisc to the multiple light sources during the custom white balance capture.

Usually, standing at the subject position and aiming the camera back towards your intended shooting position will incorporate the multiple mixed light sources illuminating your subject. The result will be a white balance that represents the average color temperature of light illuminating the exact location of the camera and ExpoDisc.

Minimizing the effect of selective colorcasts resulting from dominant unbalanced light requires some artistic choices. Using color balanced lights will minimize the visible colorcast created by any individual light source. Increasing the distance between the subject and a light source will diffuse and subsequently reduce the intensity and influence of a single color temperature light on the subject.

A photographer can also choose to enhance, or minimize a colorcast when shooting in a mixed light environment by adjusting where the camera is pointed for the custom white balance capture. If choosing between a warmer and cooler light source, it is recommended that you set the custom white balance to the cooler light source. This will result in a slightly warmer image. Balancing to a warmer light source in the presence of a cooler light source will result in a cooler image.

If the introduction of white flash light (5500K) into a warm ambient light environment caused a bluish colorcast, then it may be possible to modify the output of the flash unit to the ambient color temperature light source by using gels on the flash/fill lights. For example, use an 85 gel over the flash to match incandescent light, or a 30 green to match fluorescent light.

## *Copyright Notice*

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written permission of ExpoImaging, Inc. The information contained herein is designed only for use with this ExpoImaging, Inc. product. ExpoImaging, Inc. is not responsible for any use of this information as applied to other equipment.

ExpoImaging, Inc. shall not be liable to the purchaser of this product or third parties for damages, losses, costs, or expenses incurred by purchaser or third parties as a result of: accident, misuse, or abuse of this product or unauthorized modifications, repairs, or alterations to this product, or failure to strictly comply with ExpoImaging, Inc. instructions for use.

## *Trademarks*

ExpoDisc and ExpoImaging are trademarks of ExpoImaging, Inc.

General Notice: Other product names used herein are for identification purposes only and may be trademarks of their respective owners. ExpoImaging, Inc. disclaims any and all rights in those marks.

© 2006 ExpoImaging, Inc.  
05/06

## *ExpoImaging, Inc., Limited Warranty*

**What Is Covered:** ExpoImaging, Inc. (“ExpoDisc”) warrants to the original retail purchaser that the ExpoDisc filter covered by this limited warranty statement, conforms to the manufacturer’s specifications and will be free from defects in workmanship and materials for a period of one (1) year from the date of original purchase. For warranty service, you must provide proof of the date of original purchase.

**What ExpoImaging, Inc. Will Do To Correct Problems:** Should your ExpoDisc filter prove to be defective during the warranty period, please call ExpoImaging, Inc. Technical Support at (408) 778-2040 for warranty repair instructions and return authorization. An ExpoImaging, Inc. service technician will provide telephone diagnostic service to determine whether the product requires service. If service is needed, ExpoImaging, Inc. will exchange the product without charge. ExpoImaging, Inc. will ship a replacement filter to you, freight prepaid. You are responsible for securely packaging the defective filter and returning it to ExpoImaging, Inc. within ten (10) working days of receipt of the replacement. Expo-Imaging, Inc. requires a debit or a credit card number to secure the cost of the replacement product in the event that you fail to return the defective one. The item replaced becomes ExpoImaging, Inc. property. The replacement filter may be new or refurbished to the Expo-Imaging, Inc. standard of quality, and, at ExpoImaging, Inc.’s option, may be another model of like kind and quality. ExpoImaging, Inc.’s liability for replacement of the covered filter will not exceed the original retail sales price of the covered filter. Exchange filters assume the remaining warranty period of your original product covered by this limited warranty.

**What This Warranty Does Not Cover:** This warranty covers only normal use. This warranty is not transferable. ExpoImaging, Inc. is not responsible for warranty service should the ExpoDisc label or logo be removed or should the filter fail to be properly maintained or fail to function properly as a result of misuse, abuse, improper installation, neglect, improper shipping, damage caused by disasters such as fire, flood, or service other than by ExpoImaging, Inc.

THE WARRANTY AND REMEDY PROVIDED ABOVE ARE EXCLUSIVE AND IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY, NON-INFRINGEMENT OR FITNESS FOR A PARTICULAR PURPOSE. SOME LAWS DO NOT ALLOW THE EXCLUSION OF IMPLIED WARRANTIES. IF THESE LAWS APPLY, THEN ALL EXPRESS AND IMPLIED WARRANTIES ARE LIMITED TO THE WARRANTY PERIOD IDENTIFIED ABOVE. UNLESS STATED HEREIN, ANY STATEMENT OR REPRESENTATIONS MADE BY ANY OTHER PERSON OR FIRM ARE VOID. EXCEPT AS PROVIDED IN THIS WRITTEN WARRANTY, EXPOIMAGING, INC., SHALL NOT BE LIABLE FOR ANY LOSS, INCONVENIENCE, OR DAMAGE, INCLUDING DIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL

**DAMAGES, RESULTING FROM THE USE OR INABILITY TO USE THE EXPODISC PRODUCT, WHETHER RESULTING FROM BREACH OF WARRANTY OR ANY OTHER LEGAL THEORY.**

Some jurisdictions do not allow limitations on how long an implied warranty lasts, and some jurisdictions do not allow the exclusion or limitation of incidental or consequential damages, so the above limitations and exclusions may not apply to you. This warranty gives you specific legal rights and you may have other rights which vary from jurisdiction to jurisdiction.

ExpoImaging, Inc., 365 Woodview Avenue, Suite 700, Morgan Hill, CA 95037-2840  
v 4.0. Copyright © 2006 - ExpoImaging, Inc. All rights reserved.