Removing Colour Casts

Divide Blend Mode Technique

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REMOVING COLOUR CASTS

A **colour cast** is a visible colour tint to an image that can occur because white balance is incorrect or the scene is illuminated with coloured light. There are numerous ways to remove unwanted colour casts in Photoshop. ***The technique described here uses the "Divide" layer blending mode*** and it works best for images that have some area that you know should be white or very light grey.

1. Open your image in Photoshop and make whatever adjustments are necessary to exposure, contrast, and so on. For example:

2. In this image the ice has a distinct blue cast so the aim is to reduce that. The first step is to identify an area in the image that should be almost white (but not blown out). There is a suitable area in the bottom right corner of the image:

3. When the Colour Sampling tool is selected and placed at that point the "Info" window shows that the RGB values at that point are 188, 194,200 which confirms that there is a slight
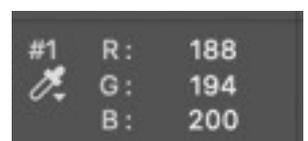
blue colour cast. If the "Info" window is not open select it from the menu using Window>Info or press F8.

4. If the Eye Dropped tool is selected and clicked over the sampling point the foreground colour showing in the tool bar will change to that sampled value:


5. In the Layers palette, add a new Solid Colour layer (as the top layer) and it will be filled with the sampled colour.

6. The next step is to change the blend mode of the colour fill layer to "Divide". The Layers plate will now look like this:
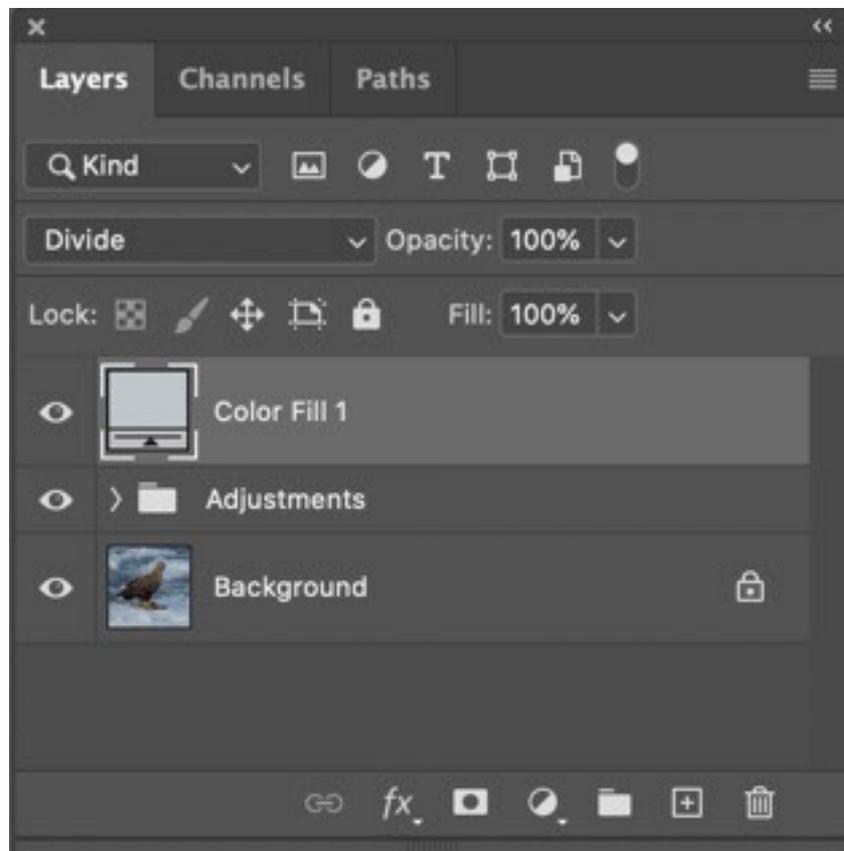
Note: I have put all the original adjustments to the image into a group and they appear just as a single group "Adjustments" layer as the details of those adjustments are not relevant to this explanation.

7. The colour cast should now have disappeared and the RGB values at the sampling point will have changed so that they are equal (or very close to equal). In my example they became:
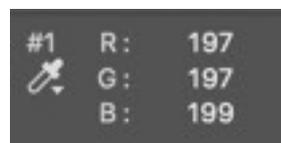
The image in this example is now:

In some cases, this process will result in a small loss of detail in the brightest areas of the image - as you can see above. If this happens, double click on the icon in the Colour Fill layer to reopen the Colour Fill window. Then type in a new value of "100" for the"B" (brightness) value:
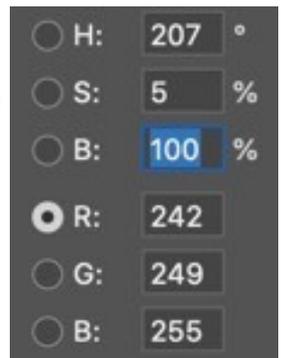
This will darken the image slightly and bring back the highlight details. If the image darkens too much, try making the "B" value a little smaller, perhaps 90 rather than 100 (image below).

Why Does This Work?

For the mathematical minded (or simply those who are curious) here is why the above technique works.

Each layer blend mode in Photoshop uses a different mathematical formulae to calculate how the pixels in the blend layer interact with the pixels in the layers beneath it to produce the final result. For the Divide blend mode the formula is:

$$\text{Resulting Colour} = 256 \div (a \div b)$$

where a = colour of the pixel on the layer with Divide blend mode
     b = colour of the pixel directly beneath the blend layer

To understand this formula, try the following:
1. Open Photoshop and create a new blank document. (It does not matter what size it is.) The 'image' you create will be all white and in the Layers palette you will see it labelled ass "Background".
2. In the Layers palette create a new "Solid Colour"" fill layer. It does not matter what colour it is, but for purposes of this exercise I created a green layer for which the RGB values were 60 160 140. (This will be lawyer "b" in the formula above.)
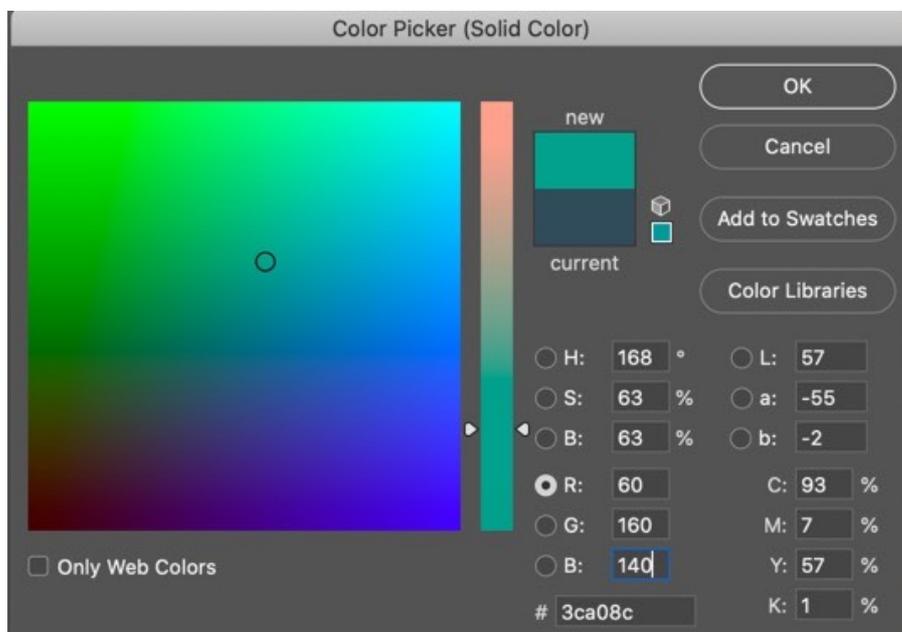
3. Above this layer I created another solid fill layer of a different colour - I used a yellow layer with RGB values of 255 215 150. This will be layer "'a" in the formula above.)
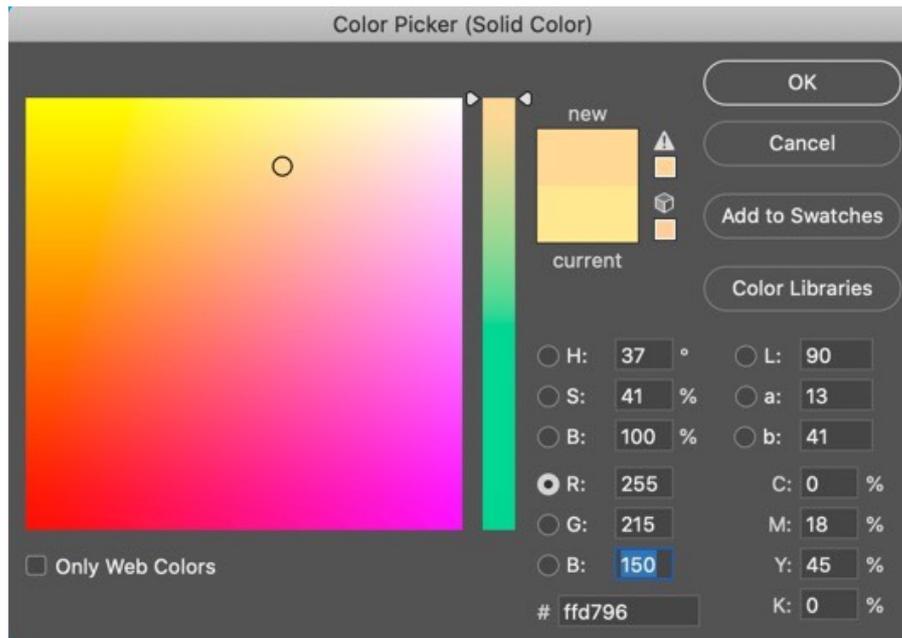
4. Change the blend mode of the top (yellow) layer to Divide and observe what happens. The colour of the image will change to a light blue.
5. From the menu select Window>Info so that the Info window is visible.
6. Move the mouse anywhere over the image to sample the colour and in the Info window you will see that the RGB values of the blue colour are 60 190 238:
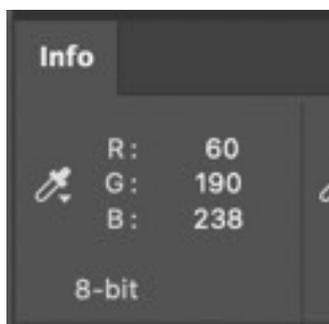
7. If you substitute the RGB values from Layers "a" and "b" into the formula you get this:

$$\text{Resulting R Colour} = 256 \div (255 \div 60) = 60$$

$$\text{Resulting G Colour} = 256 \div (215 \div 160) = 191$$

$$\text{Resulting B Colour} = 256 \div (150 \div 140) = 239$$

The resulting RGB values (60 191 239) are not exactly the same as the sampled values (60 190 238) but the small difference is simply due to the "'rounding off'" that Photoshop does in the calculations.

When the calculation of "Resulting Value" gives a result that is greater than 255 Photoshop simply makes the result 255 because that is the largest value that any R, G or B colour component can have.

To see how this Divide blend mode process can remove colour casts you need to consider what happens when the RGB values in layer "a" (the blending layer) are the same as the values in the "b" layer (the layer below the blending layer. In the formula, if a=b the formula becomes:

Resulting Colour = 256 ÷ (b ÷ b) = 256

and since RGB values of 256 256 256 gives white the colour cast disappears.

Have fun experimenting! If you find any errors (or confusing bits) in this document please email me.

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