

Photoshop (6.0 to CS) Color Tutorial

Needs: Adobe Photoshop (6.0 - CS2) and Sample Images from Adobe CD-ROM.

Since the recent release of Photoshop 6, I've seen numerous posts on web forums and received many e-mails on the subject of handling color. Many were from people who had difficulty grasping the concepts of the new color architecture in Version 6. These misunderstandings appear to originate from users who are used to the way Photoshop 5 handled color documents. This is understandable, since Photoshop 5's method was considered quite inflexible and, in some cases, downright dangerous. After working with Photoshop 5 for several years, it's natural for people to misunderstand the logic and power of Photoshop 6. This tutorial explains the new document specific color features, including the Assign Profile command, as well as the advantages of the new Convert to Profile feature. I'll also investigate the behavior of documents and how they preview based on the color policies found in the Color Settings dialog.

Document Specific Color

One of the most powerful features in Photoshop 6 is the ability to correctly preview multiple open documents occupying multiple colorspaces even if these documents have embedded profiles. This alone may be the most difficult concept for Photoshop 5 users to understand, especially when considering how inflexible image handling was due to the marriage of open documents and Working Space settings. Photoshop, in both versions 5 and 6, needed to know the document's colorspace used in order to create an accurate on-screen preview of that document. In Photoshop 5, this description was set for all documents in the RGB, CMYK and Grayscale Working Space preferences. If a user set the RGB Working Space to Adobe RGB 1998, Photoshop 5 would assume that all open RGB documents were indeed in this same colorspace. Of course, there were warnings for profile mismatching or for missing profiles of all the documents as they were opened. However, assuming the user opened these documents, whatever the settings were in Photoshop 5's Working Space preferences were assumed to be correct for all open documents. If a user opened a document in sRGB (but ignored the Profile Mismatch, if so set), Photoshop 5 would have no idea that this document was indeed in sRGB and therefore would produce a on-screen preview with the assumption that the document was in Adobe RGB 1998. If a user simultaneously opened two documents, one in Adobe RGB 1998 and another in sRGB while the user toggled the RGB Working Space from Adobe RGB 1998 to sRGB, both documents would instantly update their previews based on this setting. In essence, Photoshop assigned one or the other colorspace descriptions to both documents (more about assigning profiles later). The bottom line was that in Photoshop 5 users knew they needed the Working Space settings to be in sync with any open document for a correct preview. Users often had to toggle different Working Spaces in the Color Preferences to ensure that the settings matched the open document.

In Photoshop 6, these restrictive shortcomings don't exist. The Working Space (be it RGB, CMYK or Grayscale) doesn't have to have any relation to open documents as long as all open documents are tagged! Photoshop 6 will simply examine the description of all tagged documents and use that information on a document-by-document basis to produce correct previews. In other words, all documents that have descriptions of their colorspace will be previewed correctly because the proper description is embedded in each document. This not only means that it is possible to have a document opened and previewed correctly in sRGB and Adobe RGB 1998 but that the RGB Working Space could be set to ColorMatch RGB. Then that RGB Working Space will have no effect on these two open documents. So, what is the role of the RGB Working in Photoshop 6? As I said, Photoshop always needs a description of each open document in order to conduct a preview

(or for doing any color conversion).

What happens when a user opens an untagged document? The current Working Space setting is used both as an assumption for the color of that document as well as for the preview and conversion. Therefore, in the example used above, if the RGB Working Space were set to ColorMatch RGB and a user opened an untagged document, Photoshop would use ColorMatch RGB to create the preview. If the user then went into the Color Settings and changed the RGB Working Space to Wide Gamut RGB, the open untagged document would change its color appearance (much like the behavior of Photoshop 5) while the preview of the documents in sRGB and Adobe RGB would remain the same. By changing the RGB Working Space from ColorMatch RGB to Wide Gamut RGB, we are in essence assigning a new profile for the untagged document. Hence it's preview changes based on this new assignment. The other role of the RGB Working Space occurs when a user makes a new document. When the color policy is set to anything but "Off", a new document (Command/Control-N) will be assigned the color description of the Working Space currently set. I mention the "Off" policy as this attempts to enforce a behavior where documents remain untagged. As a result, it isn't a recommended policy for this very reason.

Tutorial

1. Open the Color Settings in Photoshop 6 (Command/Control-Shift-K).

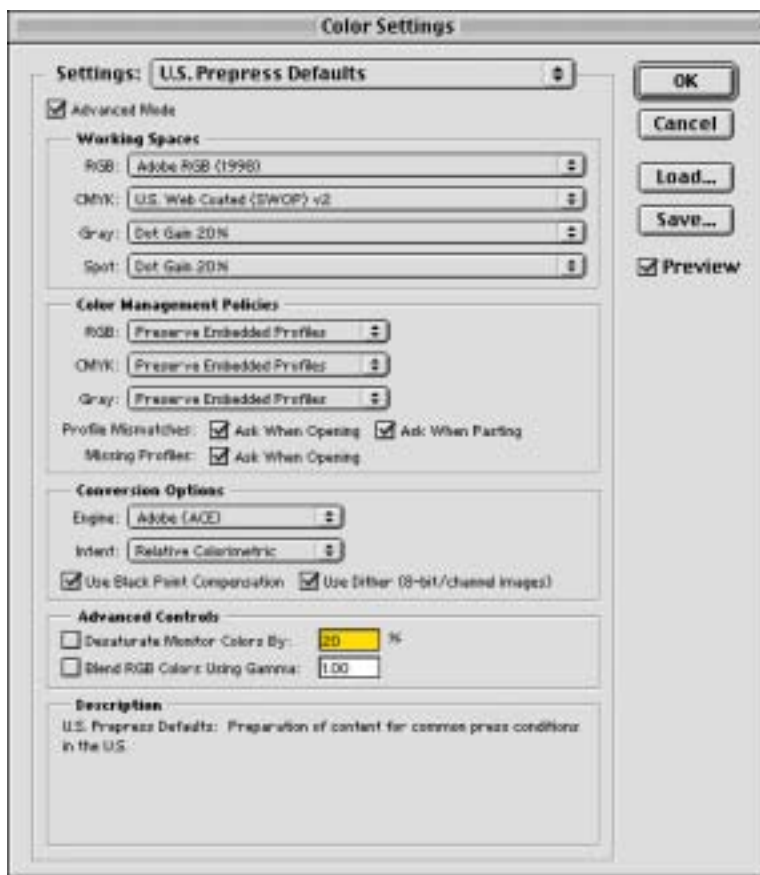


Figure 1. The Color Settings dialog in Photoshop 6 in advanced mode. Be sure to have the U.S. Prepress setting loaded as show here.

2. For this exercise, set the Color Settings to "U.S. Prepress." Notice that the RGB Working Space for this saved setting is Adobe RGB 1998 and the policy is set to Preserve as shown in Figure 1. Make sure that your settings match those in Figure 1, then click on the OK button to accept.

3. Open the Bear.psd image, which is in the Samples folder that shipped with Photoshop 6. You should get a Missing Profile dialog as seen in Figure 2. Notice that you have an option to keep the document untagged as seen in the default radio button, assign the Working Space (which is Adobe RGB 1998 as was set in the U.S. Prepress Setting) or assign a profile. It's quite possible that the profile in the bottom radio button is different then what you see here, as it is "sticky" meaning, it remembers the last setting used. In Figure 2, it happens to be set to Wide Gamut RGB.

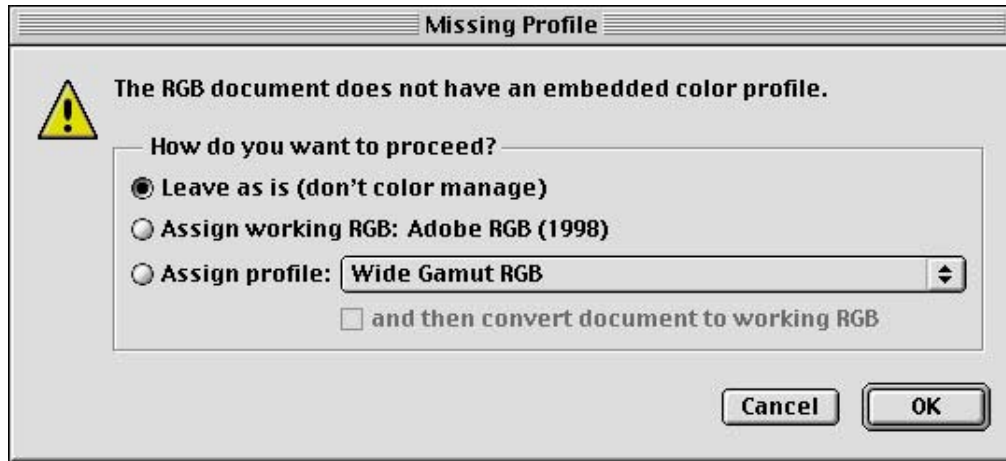


Figure 2. The new Missing Profile dialog.

3. Keep the top radio button (Don't Color Manage) set and click OK. The document opens but it's quite possible the preview you see doesn't look very good. For this tutorial, have the "Document Profile" option picked in the popup below and to the left of the image. This should indicate that this image is "Untagged" as seen in Figure 3.

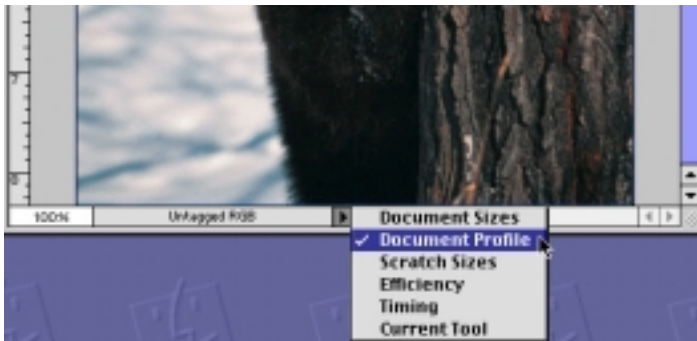


Figure 3. Be sure to set the Document Profile option as seen here. This will allow the user to keep track of all profiles assigned to open files.

4. Open the document Zebra.psd that is also in the sample folder that shipped with Photoshop 6. You should get a Profile Mismatch dialog as seen in Figure 4. Notice that this dialog provides some very useful information. We can see that the document being opened has been tagged with sRGB and the dialog reminds us that the currently set RGB Working Space is in Adobe RGB 1998. Because the policy is set to "Preserve" the default is for the top radio button to be selected (Use the embedded profile instead of the working space). Notice that we could convert the document from sRGB to Adobe RGB to match our RGB Working Space if we selected the 2nd radio button. However, there's no reason to do this just to get the document to preview correctly as was necessary in Photoshop 5. We want to keep this document in sRGB so just keep the top radio button checked and click the OK button.

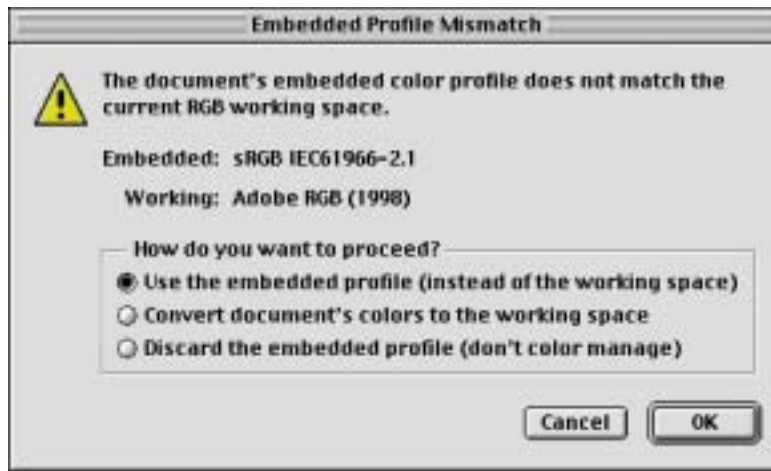


Figure 4. The Embedded Profile Mismatch dialog seen here provides a wealth of information. The Embedded profile is shown as well as a reminder of the currently configured Working Space. The 3 radio buttons allow the file to be opened with the existing embedded profile, allows the user to conduct a conversion into the currently configured Working Space or to ignore the profile which opens the file as untagged. The Color Management Policies seen in Figure 5 will initially affect the default behaviors for these radio buttons. When the warnings for mismatches or missing profiles are off, this dialog will not be shown and the options here will automatically be carried out depending on the policy chosen.

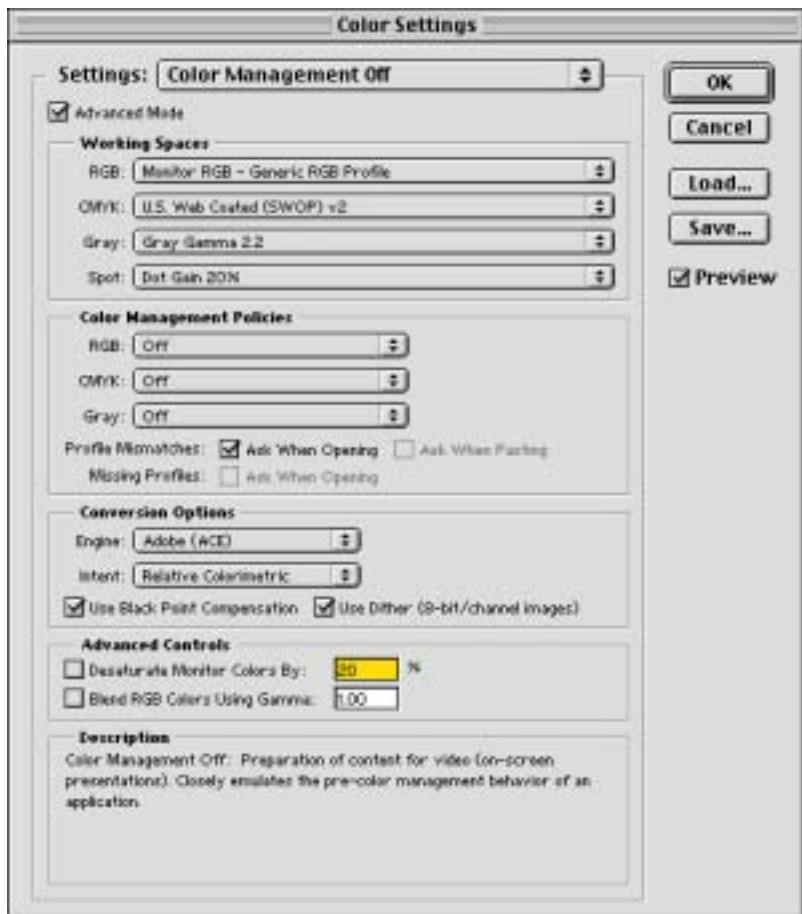


Figure 5. For this tutorial, set the saved setting popup menu to “Color Management Off” seen here. Notice the warning check boxes. The Missing Profile warning check box is grayed out so that untagged files opened with this setting are kept untagged.

5. Arrange both document windows so you can easily see both images. Now go into the Color Settings and just change the RGB Working Space from Adobe RGB 1998 to Apple RGB. Examine the two documents (you may need to move the Color Settings dialog around a bit). The document that was untagged (Bear.psd) changes it's appearance because we have provided a new description for this untagged document. We have in essence "assigned" Apple RGB to this document and so the preview has changed. The Zebra document doesn't change its appearance at all because Photoshop is still using its embedded sRGB profile or the preview.

What you can see here is that untagged documents are quite problematic! The appearance of these documents is affected by whatever Working Space happens to be assigned in the Color Settings. Also, be aware this behavior seen above is true for Grayscale documents that have gamma settings or dot gain settings. These documents have a descriptor of their condition and are therefore not affected by changing the Grayscale Working Space settings. ONLY untagged documents will alter their behavior when Working Spaces are altered. Photoshop has to make some assumption about the color of untagged documents and that assumption happens to be the currently set Working Space for RGB, CMYK or Grayscale.

6. Go back into the Color Settings Dialog and now toggle the settings from "US Prepress" to "Color Management Off" as seen in Figure 5. Notice that the Policies are set to "Off."

7. Make a new document (Command N) and set the colorspace to Gray as seen in Figure 6. The size doesn't matter for this tutorial. When the document opens, you may need to enlarge the document window but you should see the document set to "Untagged Grayscale"



Figure 6. Create a new grayscale file (Command N). The size of the file is not important for this tutorial.

8. Go under the Edit menu and select the "Fill..." Command and pick "50% Gray" then click on the OK button. The image is filled with gray.

9. Go back into the Color Settings Dialog and change the gamma settings from 2.2 (the default) to 1.8 or to other Dot Gain settings and you will notice that the grayscale document you just made changes its appearance, which is logical as this file is an untagged document. You can cancel out of this dialog.

Now we're going to assign a profile to this untagged document to illustrate one use of the new Assign Profile command. The Assign Profile command doesn't alter the data in the document. It only produces a description of the document and tags the document.

10. Go into the Image Menu, select the "Mode" submenu. Then select the "Assign Profile" command. The dialog shown in Figure 7 will appear. If you wish to assign the currently specified Grayscale Working Space, do so by selecting the middle radio button. But for this exercise, click on the 3rd radio button and notice that as you toggle different options in the popup menu, two things occur. First, the preview changes because you are telling Photoshop exactly what description to use for the preview (and eventually for conversions) of this document. Also, notice that the document's profile description updates itself as soon as you release the popup menu. If you click the OK button, whatever profile you've assigned will be used to preview the document. That profile (in this case a gamma or dot gain setting) will be assigned and saved to the document. No longer is the document untagged. The document specific color features in Photoshop 6 will now be used for this document regardless of the Working Space settings.

The Assign Profile can be used to remove a profile although the likelihood of needing to do this is rare. The Assign Profile command can be used in a situation where there's an untagged document but you know the correct profile that should be used to describe this document for Photoshop. This could occur when you have an image from a scanner or digital camera that can't embed a profile at the time of capture. The Assign Profile command doesn't alter any of the data in the document. The numbers remain the same. You can test this by having the Info palette accessible. To see this, open the Assign Profile command and examine the numbers in a document as you toggle different profiles within the Assign Profile dialog. While the appearance of the document may change as you toggle different profiles, the numbers remain the same. Assign Profile changes the meaning of the numbers as far as Photoshop is concerned. But Assign Profile never actually changes those numbers.

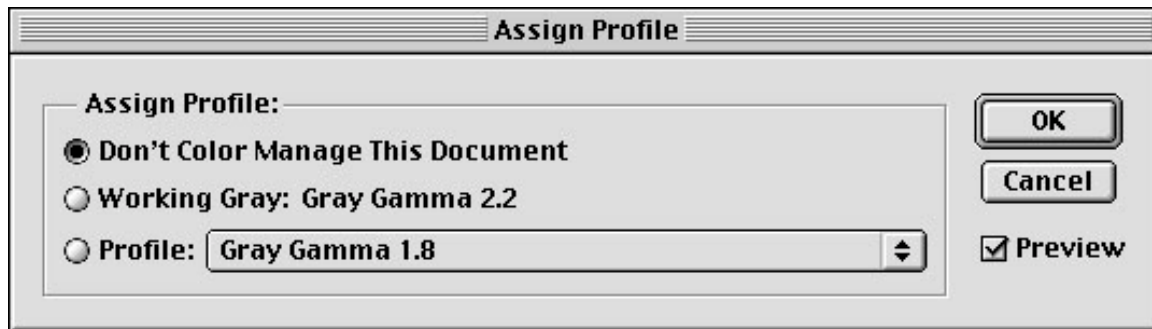


Figure 7. The Assign Profile command.

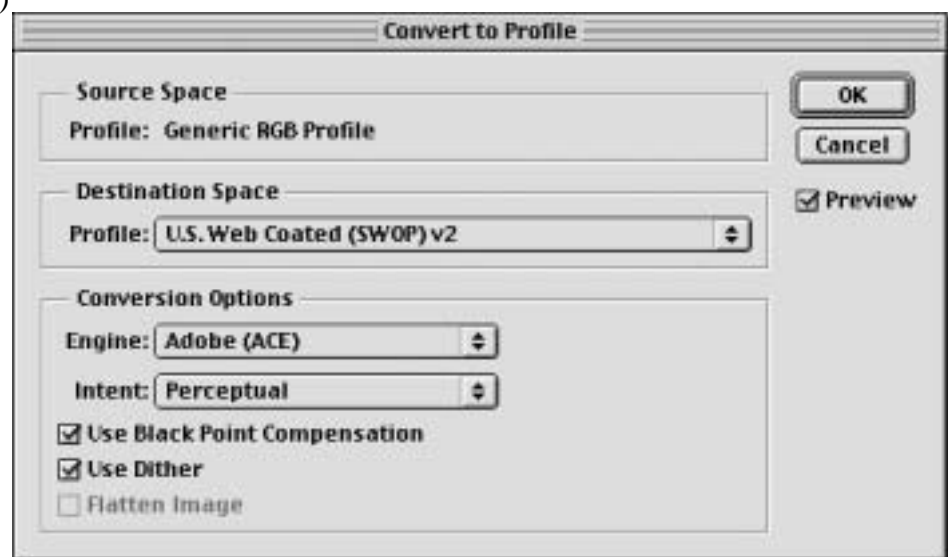
Convert to Profile

The Convert to Profile command in Photoshop 6 does indeed change the numbers in the document unlike the Assign Profile command. It's functionally is akin to the "Profile to Profile" command found in Photoshop 5. The Convert to Profile also assigns the correct profile after a conversion has occurred so that if you were to convert a document from Adobe RGB 1998 to sRGB, the numbers would change in the document. But the document would also be tagged (assigned) sRGB as well. This insures that a proper preview will be seen. The old Profile to Profile command changed the

numbers. But since the document was linked to the old Working Space settings, the preview was always inaccurate. This explains why users who converted to an output space, let's say to an Epson 1270 output profile, would see such an ugly looking preview after using Profile to Profile in Photoshop 5. This document, even while in an Epson 1270 RGB output space would have a preview that would be completely wrong. That's because it would be displayed through an "assigned" RGB Working Space profile chosen by the user. Additionally, the document, if saved, would be embedded with the original RGB Working Space profile and not the newer (and correct) Epson 1270 profile. Both these huge problems are completely eliminated in Photoshop 6. For example, when a user converts from an Adobe RGB 1998 to Epson 1270 RGB using the Convert to Profile command in Photoshop 6, the image gets converted to the new colorspace much like the Profile to Profile command in Photoshop 5. However, the correct profile (Epson 1270) would be rightfully assigned to the converted document. Since Photoshop 6 supports document specific color, the Epson 1270 profile is used for the preview. No more ugly and inaccurate previews linked to the RGB Working Space. In fact, the preview is now a "soft proof" of the output. For these reasons, it's ideal to use the Convert to Profile command for all colorspace conversions! Additionally, a user can toggle different rendering intents, CMM's and other options in the Convert to Profile command and the underlying image that's affected will update its preview based on these options prior to document conversion. Lets see this in action.

1. Have the Bear.psd document open and active. Even though this file has no assigned profile (it's untagged) it will still work for this exercise.
2. Invoke the Convert to Profile command (Image-Mode-Convert to Profile ...).
3. The Convert to Profile command should appear as shown in Figure 8. Choose the US Web Coated SWOP profile as seen in Figure 8. Notice that the "Source Space" is "Generic RGB" because we had our Color Settings set to "No Color Management" from step 6 above. (This is the RGB Working Space in this saved setting.)

Figure 8. The Convert to Profile command is functionally equivalent to the old Profile to Profile command in Photoshop 5. There are many added benefits such as the ability to preview a file as one toggles the rendering intents or other options seen here.



These settings (No Color Management and an untagged document) aren't the recommend way to be working in Photoshop 6! It does illustrate how this untagged document is being affected by its

current untagged state with the Color Settings set as they are. By changing the output profile from US SWOP to another output profile that happens to be loaded on your machine, you should see the preview of the Bear.psd document change. Also, you'll notice that changing the Rendering intent or Black Point Compensation will also affect the preview. (For more information read *Photoshop 6 Color Management**.) This allows us to pick the best possible settings on a image by image bases, based on the preview we see. Now it's possible to pick a Relative Colorimetric intent over a Perceptual intent based on preferences of how the document previews. You will likely not see much, if any, change by toggling the CMM. But it's worth testing.

4. To continue be sure to reset your color setting back to your preferred working conditions. We do not recommend the "No Color Management" settings for obvious reasons.

Convert to Profile is a great way to insure there are no surprises when performing colorspace conversions because the preview shown will be a very accurate indication of what the output should look like (assuming accurate profiles for your display and output device). After accepting the changes and clicking on the OK button, the Convert to Profile command will alter all the data in the document using both the source and destination profile picked and will assign the correct destination profile to the document. The document will saved with the correct profile assigned and be embedded in the document. The document will then preview correctly without regard to other color settings (Working Spaces) because it is based on an assigned profile.

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