



## Archives/March 2001

### DIGITAL DIRECTIONS

#### Processing Errors and the Digital Fix

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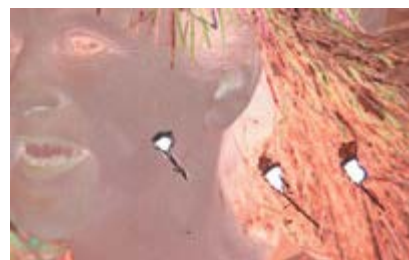
We doubt you will ever have a photo lab customer who is happy to hear you had a problem processing their film. We are all extremely careful, but unfortunately because of the nature of film, there are dozens of places along the processing path where something can go wrong. Equipment can break down, a lab tech can make a mistake or chemistry is not mixed correctly.

IT IS TRUE THAT regular equipment maintenance and employee education can cut down on the possibilities of a problem, but eventually a sad lab day will come.

Before digital photography entered the arena, most of these errors could not be corrected without extensive cost or time. With the aid of your digital lab services, you may be able to salvage some of the lesser processing errors. For the more serious film problems that are beyond help, you need to develop a compensation protocol for that will satisfy the customer and preserve your reputation.

We can't even begin to cover all the potential types of processing errors, so we have narrowed the scope to a few that best represent the more common errors we have seen over the years. Our solutions should only be used as guidelines to help you solve these and other processing problems.

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Closeup of negative damaged during processing. A steel reel seems to be the problem.

#### Under/Over Processing

Before you assume that a roll of film has been improperly processed, you should look at the rebate edges of the suspect film. Compare the frame numbers and film name to the same on a properly processed roll of film. If the rebate numbers and film name are close in exposure density but the images are not, then camera exposure may be the cause, not incorrect processing.

You can save your customers the grief of losing another roll by suggesting that they have a problem with their camera.

If both the images and rebate edges are not the same as the properly exposed roll, then processing is probably the problem. You will need to investigate the

cause, and then determine if it is worth repairing the image.

In many cases it might be less expensive to compensate the customer rather than trying to fix the images. If indeed the images are vitally important to the customer, then the digital side of the lab may be able to help you. Since repairing slide and negative films are each a different process, we will handle them separately.

#### Negatives

Color negative film has a wide latitude in the over-exposure area, so over-processed negatives can usually be printed on a traditional printing system by just adding exposure. If the contrast becomes too high, you can scan the image into your editing system and lower the gamma, create a digital print, or output a new negative using a film recorder.

Under-processed color negatives will start to lose detail in the shadows, and the resulting prints will be very flat with no blacks in the shadows. This problem can be partially resolved by going to the Image Adjust and using the Histogram editor if you use Adobe Photoshop.

A Histogram is a visual display of all the digital data contained in an image from black to white. At the bottom of the Histogram you will find three sliding triangles that control the shadows (left s), midtones (centers), and the highlights (right s). These sliders can be moved to adjust the gamma.



Positive scanned image of damaged color negative.

Often the scan may not be perfect, and the data may fall short of the maximum allowed. If the black is not a pure black in the image, there will be a small space at the left with no data. You will see that the data will start somewhere to the right of the black triangle. Using the mouse, move the left slider over until it approaches the black data in the image.

When you release the mouse, all the data in the image will readjust to fit the photographic curve correctly. Additional adjustment may have to be made to each of the separate colors on the Histogram if a color shift appears from this under-processing.

### Slides

Overexposed slide film will start to lose detail in the highlights. You can't get this detail back, it is just lost forever. You can, however, scan the image into your editing program and using the Curve editor or Histogram, make some adjustments. You would reduce the density in the highlights and the midtones so they would more closely resemble a normal slide. This is not a perfect fix, but in many cases, it makes the image usable.

Underexposed slides are a different story. Scan the image into your system, compensating for the underexposure. Be sure you don't over do it or you will achieve a posterization effect.

Use the Histogram editor as before to raise the midtone and highlight levels. Some shadow detail will be lost, but in most images this detail is less critical than highlight detail. Try the Auto Levels feature first, as it will often automatically correct many problems.

If you want more advanced control of the curves, you can go to the same Image Adjust pulldown and use the Curve menu to manually bend and manipulate the photographic curve.

Chemical Contamination If film processing equipment is not cleaned properly or chemistry is not handled safely, chemical contamination may result. This will eventually shift the color of processed film and may have an adverse effect on the film's DMax.

In most cases making a color correction will not help, as the photographic curves themselves are out of alignment. You will need to have the Histogram editor step in to help again. Load the newly scanned images into your editing program and start the Histogram editor. It can either display all the color layers at once in RGB or one layer at a time as R=red, G=green or B=blue. You then can either adjust one color layer at a time or all the curves at once.

If there is a color shift in the shadows, you should go to that specific color channel. You will notice that the shadow detail in that channel's Histogram is pushed to the right or in the midtone area. If you move the left s slider to match the edge of the data, you are effectively bending the curve to correct the color shift.

You still may notice a slight shift in the shadows, so be sure to check the other two color channels. Even after these corrections are made, you still may have to go to the Color Balance function and make a slight overall color correction before achieving total satisfaction.

### Let's Stick Together

Occasionally wet film will get stuck together, and when separated part of the film's emulsion is removed. Ouch! This is one of the more difficult problems to repair, and will require someone with extensive expertise in digital color channels, histograms, curve editing, and use of the clone tool. Images damaged with chemical stains can also be treated using this same repair procedure.



Under-processed film with histogram showing how data falls on standard photographic curve.

First, go to the Layers menu and create an Adjustment layer. With this layer you can make all the corrections and then

blend them into the underneath layer using the opacity setting. Select the area to be repaired using the Magic Wand. If this does not work, you will then have to zoom in on the area and manually select along the edges of the damage zone.

Once this is done, load in the Histogram editor, and go to the color channel most affected by the damage. Move the sliders in highlight, midtone, and shadow area to reduce the effect of the damage.

Try one channel and then the next, back and forth until you have exhausted all efforts. Use the clone tool to retouch any edges or artifacts that still show. You may also have to use the Burn and Dodge tool to reduce or lighten the exposure in specific areas along the edge of the damaged area.

### **Mounter/Film Cutting Damage**

Mechanical devices can often cause damage as the film is loaded or unloaded. Damage to film usually results in cuts, tears, holes, or scratches. If the damage is small scratches on the surface of the film, there is a new innovative technology called Digital ICE (Digital Image Enhancement) by Applied Science Fiction. This scanning technology is incorporated in a variety of film and flatbed scanners through internal software and hardware modifications.

The goal of the Digital ICE technology is to remove surface defects without altering the underlying image. Now you can automatically remove unwanted scratches, dust and fingerprints while the film is being scanned. Many times all the damage is repaired, but if not, it greatly reduces the time needed for additional restoration using image editing software.

When the damage goes deeper, you will have to reach into your digital toolbox and pull out the clone tool. Zoom in on the area to be repaired and slowly clone areas next to the scratch over the damaged area. Make sure that the clone tool is slightly larger than the width of the scratch and take to clone areas similar to those in the damaged area. If there is a large data area missing, and you have a similar undamaged material, you can scan the good image and clone data from it. Holes punched in film can be treated the same way, but be careful that your cloning does not create a pattern of repetition.

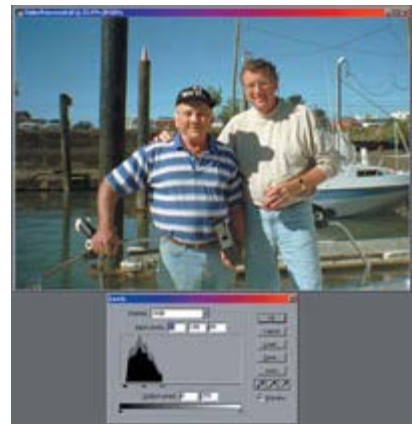
If the image is cut in half as with a film cutter, you can carefully mount the two halves in one slide mount and scan it into the computer.

Select either half and blend them back together, and touch up the blend using the clone tool. If you find that the edges of the cut bend and do not scan well, you may have to resort to mounting the images in a clean glass mount to hold the two halves flat.

### **Just the Beginning**

Unfortunately, there are many more things that can go wrong in a lab and digital may not always be able to help. We only hope that by looking at a couple of these examples, you will see the potential of using the digital side of your photo lab to help solve problems on the traditional side of your business.

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Histogram of under-processed film. Yellow arrow show how you correct image by moving both shadow and highlight sliders. Midtone slide automatically moves with the other two sliders.

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