

# Diagnosing problems

It is helpful to be able to diagnose image problems as the first step to finding a solution that either prevents, or lessens the likelihood of, the problem occurring again. The most common film problems are poor exposure or development, or a combination of both. Digital problems (*see pp.320–21*) vary a great deal in nature, while printing problems (*see p.322*) form a separate group.

## BLACK-AND-WHITE PROCESSING AND PRINTING PROBLEMS

The first set of problems considered here are various combinations of exposure with development. Study them carefully and you will see that some problems can be turned to your advantage in certain circumstances. Other problems—from surge marks to light fog—are caused by poor handling, and should be avoided at all times.

PROBLEM	SYMPTOM	SOLUTION
 <p><b>Thin, flat negative</b></p>	This negative is very thin, with little density even in bright areas (highlights) of the image. This is because of underexposure combined with underdevelopment, so that there is insufficient time for density to build up in the highlights.	Give full exposure, particularly if the subject contrast is low. If in doubt, expose for areas a little darker than mid-tone gray. Develop according to instructions, following directions for dilution, agitation, and temperature as accurately as possible.
 <p><b>Thin negative</b></p>	The negative is thin, with little detail in the mid-tones, but highlight areas appear to have good density. This is caused by underexposure combined with correct or sufficient development.	Expose so that shadow areas with important detail are fully exposed. In this image, the bright background caused the girl's face to be underexposed. Extra development may rescue some shadow details.
 <p><b>Flat negative</b></p>	Highlight densities appear correct but overall the image appears flat and low in contrast. This is caused by giving a correct exposure, followed with underdevelopment sufficient to build density in the highlights, but not to increase contrast.	Develop your negatives to give the contrast that you prefer to print with—the exact contrast is largely a matter of personal taste. A little underdevelopment can be used to reduce the contrast of negatives of high-contrast scenes.
 <p><b>Contrasty negative</b></p>	Giving the image correct exposure at the time of capture but overdeveloping when processing results in a very contrasty negative. The highlights are blocked out to solid black and mid-tones are very heavy. It will be very difficult to make a good print.	Print on soft (low-contrast) paper or a low-contrast grade of paper to compensate for the high contrast of the film. To avoid the problem in the future, slightly underdevelop a film exposed in a high-contrast situation, avoiding overdevelopment at all costs.
 <p><b>Heavy negative</b></p>	This image shows poor shadow details, yet the overall density of the image is high—it appears a dark gray. The cause is underexposure, which failed to capture shadow details, combined with overdevelopment, which created density over the whole image.	It is best to give correct exposure and development, but underexposure may be necessary in poor lighting conditions. Extra development may be given to compensate, to create a usable negative. This is the basis of “push-processing.”

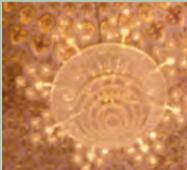


 <p><b>Flat, heavy negative</b></p>	<p>A negative that is relatively low in contrast or flat, but with normal or high density overall, is likely to result from overexposure and underdevelopment.</p>	<p>In highly contrasty lighting conditions, full development may not give the best print. Give extra exposure when photographing to allow for reduced development so that the contrast of the negative is reduced. This is the basis of “pull-processing.”</p>
 <p><b>Very dense negative</b></p>	<p>Overexposure combined with overdevelopment will give rise to very dense negatives with high contrast. These negatives can be all but impossible to print. And they are also all but impossible to scan properly.</p>	<p>Avoid compounding overexposure by overdeveloping the negative. In extreme cases, bleaching solutions may be applied to reduce overall density. Professional drum-scanning may also help to improve the quality of the image.</p>
 <p><b>Surge marks</b></p>	<p>There is increased density in this negative, in a pattern that corresponds to the holes in the film. These are caused by over-agitation that causes developer to rush through the sprocket holes of the film with great turbulence and give extra local development.</p>	<p>Reduce agitation or ensure that you invert the tank fully during agitation. Do not shake the tank from side to side. Alternatively, agitate by twirling the spirals or by stirring the developer.</p>
 <p><b>Water marks</b></p>	<p>Irregular crescent-shaped or round areas of lightness in a print are usually caused by lime deposits from droplets of hard (calciferous) water drying on the film.</p>	<p>When you have reached the end of film processing and have a clean film, soak it in a bath with wetting agent, gently shake off any excess water, and hang it to dry. If possible, wipe off the water using a photographic squeegee.</p>
 <p><b>X-ray marks</b></p>	<p>This area of a black-and-white film should be clear, but it carries patterns that repeat across the roll of film. It has been caused by X-rays used to check luggage kept in the cargo hold of an aircraft. These are much more powerful than those used for hand luggage.</p>	<p>Never place film in luggage that will be carried in the cargo hold. Do not use X-ray protective bags, since security staff will simply increase the power of the X-rays to penetrate the bags. Always carry unprocessed film—exposed or unexposed—in carry-on luggage.</p>
 <p><b>Air bubbles</b></p>	<p>A small number of black or gray dots, sometimes with a darker center, are scattered randomly over the film. Air bubbles were trapped when developer was poured in, slowing development at that point to cause a reduction in density in the negative.</p>	<p>Make sure the lid is fastened tightly, then tap the developing tank firmly against the bench after developer has been added and the lid has been fastened. This dislodges any air bubbles that may be stuck on the side of the film.</p>
 <p><b>Light fogging</b></p>	<p>Some parts of the image are white, right at the edge of the film. With color film, there may be irregular bands of color. The film has been “fogged” with light—light has been let in before development.</p>	<p>Be sure you load your camera away from direct light. If you are walking outdoors on a sunny day, turn your back to the sun to load the camera. Keep rolls of film away from direct light.</p>



## COMMON DIGITAL IMAGE PROBLEMS

Digital image problems fall into two broad categories. There are those that are caused by inappropriate action from the operator or a device, such as a scanner, and there are problems, known as artifacts, caused by the nature or limitations of the digital image itself, or its processing. Artifacts include moiré effects, blocked shadows, and posterization.

PROBLEM	SYMPTOM	SOLUTION
 <p><b>Soft scan</b></p>	The scanned image appears unfocused and lacking in detail. Colors may also appear washed out and blended together. The scanner may not be properly focused on the original.	Focus manually if the scanner controls allow it. Or change the mount for the transparency to help it lie flat, and rescan. If possible place the transparency between glass holders and rescan.
 <p><b>Aliasing</b></p>	Angled lines and details appear to be jagged or saw-toothed in profile. Details are lost and sharp edges in the image appear indistinct. The resolution of the image acquisition—either scanner or digital camera—is not sufficient to define the details fully.	Increase the resolution of the scan or your camera. If you obtained this result from making the file larger, you may have increased the file size by too much. If so, set a smaller increase.
 <p><b>Newton's rings</b></p>	Multicolored concentric rings or patterns around a central core occur singly or there may be several. These are Newton's rings, caused by a small amount of air trapped between scanner and original behaving like a prism.	If scanning a slide, place it in a frame so that it does not touch the scanner glass. If scanning a film-strip, raise it off the glass with a sheet of paper with a window cut out of it. Ensuring that the glass is perfectly dry may also help.
 <p><b>Print moiré</b></p>	A new pattern of dots emerges when printed material is scanned. The pattern may disappear if the file is printed or viewed at a different size. There is a clash between the pattern of the printed material and that of the scanner.	Rotate the original by a small amount—5 degrees, for example—and scan again. If the pattern persists, rotate a little more and rescan. Alternatively, change the resolution and rescan. There will be a setting at which the pattern disappears.
 <p><b>Noise in shadows</b></p>	Dark areas of the scan or digital camera image appear speckled with darker and lighter spots. This is shadow noise, caused by the system's inability to represent dark areas accurately.	If the problem is a result of scanning, you will need to upgrade your scanner to extract details from the shadows. If the problem originates in the digital camera, make sure you set the lowest sensitivity and highest quality, or use a better-quality digital camera.
 <p><b>Scanner jitter</b></p>	Scans show jagged lines with the wrong colors or details, which appear to be out of position. This is visible only at high magnification and it is caused by irregular movement of the scanning head.	Rescan with the original turned around and see if the problem is repeated. If it is, you may have a defective or, more likely, a poor-quality scanner. You will need to have the scanner repaired or use a better-quality scanner.

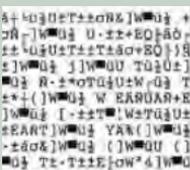


 <p><b>JPEG artifacts</b></p>	<p>The image viewed in close-up appears to be arranged in blocks of similar color, which obscure or break up details. These are the JPEG kernels or groups of pixels used to compress the image.</p>	<p>If you use JPEG compression to reduce your file size, you should set the highest quality that gives the size of file you wish to work with. Or set the highest compression that does not cause visible artifacting.</p>
 <p><b>Moiré from screen</b></p>	<p>Irregular patterns such as concentric rings or wavy bars appear across the image. These patterns disappear at certain magnifications. They are caused by a clash between any gridlike pattern in the subject with the monitor's own grid.</p>	<p>No solution is needed if the final output is to print, as screen moiré has no effect on print. But if output is to screen, you may need to work at a different resolution. Try rotating the image by 5–15 degrees, or blur the image a little.</p>
 <p><b>File error</b></p>	<p>Images take longer than usual to open, thumbnail images do not correspond to the actual image, or the images appear garbled, as shown here. The file is corrupted and data is missing or is unreadable.</p>	<p>This occurs when the medium storing the file, such as a hard-disk or memory card, is faulty. There may be incompatibilities between the memory card and the camera in which it is used. Back up all data and replace any card or disk that may be unreliable.</p>
 <p><b>Poor data</b></p>	<p>Images appear patchy, with uneven areas of color. On manipulation, images do not appear as expected. This happens when there is not enough data for the image—there are many gaps and holes in the data.</p>	<p>If the image is a scan, rescan the image at a higher resolution. If the image is a manipulated version derived from a digital camera, revert to the original image. If this is the original image, there is nothing you can do to increase the amount of data.</p>
 <p><b>Over-sharpened</b></p>	<p>Images may be nicely sharp but can also have light margins at the edges, known as haloes, and hard details, with little or no blurring. Small dots appear as sharply-defined squares. The image has been over-sharpened using Unsharp Mask.</p>	<p>Use Unsharp Mask sparingly to improve image sharpness, and only as the final step of image manipulation. If you are preparing images for use by a client, do not apply Unsharp Mask unless specifically asked to do so.</p>
 <p><b>Posterization</b></p>	<p>Transitions of tone or color in the subject appear to be stepped or banded, with sudden changes in color or density. There is insufficient image data to produce smooth changes, due to low resolution or excessive image manipulation.</p>	<p>Smooth skin tones need the highest resolution if realism is required. Capture or scan your image at the highest quality settings. Avoid excessive image manipulation such as extreme changes in contrast, exposure, or color balance.</p>
 <p><b>Blocked shadows</b></p>	<p>Shadows appear to go black suddenly, with no transition zone of darker shadows. There is no detail in the shadows. This is caused by the way some basic scanners and digital cameras encode brightness information.</p>	<p>Give ample exposure to shadow regions while avoiding over-exposure in brighter parts. Use high-quality scanners or digital cameras. If possible, process digital camera images as RAW files instead of as JPEGs.</p>



## COMMON DIGITAL PRINTING PROBLEMS

Printer problems fall broadly into three categories. There are those that are caused by inadequate communications or other incompatibilities between the printer and computer or software, there are problems caused by printer faults, and finally, there may be incompatibilities between the printer and media used for printing.

PROBLEM	SYMPTOM	SOLUTION
 <p data-bbox="101 557 246 578"><b>Loss of coverage</b></p>	<p data-bbox="334 378 619 557">The printer works well but suddenly prints uneven lines of ink, or the color balance changes. The computer or printer may have run out of memory, one or more of the cartridges may have run out of ink, or some nozzles may have become blocked.</p>	<p data-bbox="653 378 938 516">Avoid using the computer for other tasks while printing if you are working with large files or have many programs running. Run the cleaning program for the printer or replace the ink cartridges.</p>
 <p data-bbox="101 781 205 802"><b>Ink pooling</b></p>	<p data-bbox="334 602 619 740">The ink appears to lie on the surface of the paper, pools into puddles of ink, and will not dry. You are using an unsuitable paper or one that is not compatible with your printer.</p>	<p data-bbox="653 602 938 766">Use only the manufacturer's recommended papers when you first use your printer. With experience, you can experiment with other papers. Photographic printing papers are generally unsuitable for inkjet printers.</p>
 <p data-bbox="101 1005 225 1026"><b>Gibberish text</b></p>	<p data-bbox="334 826 619 1005">The printer outputs gibberish text that can go on for many pages. You may have sent the wrong type of file to the printer (the example shown is a facsimile). Or, the printer may have crashed and tried, unsuccessfully, to reconstruct an image.</p>	<p data-bbox="653 826 938 990">Turn off the printer, wait a few seconds, and turn it back on. You may need to delete the spool file (see your printer instructions). You may also need to make sure you are printing to the correct communications port.</p>
 <p data-bbox="101 1229 251 1250"><b>Uneven coverage</b></p>	<p data-bbox="334 1050 619 1214">Even areas of tone appear uneven, with gaps or streaks and visible lines. You are using a low-quality printer or one with blocked nozzles, poor-quality ink cartridges, or low-quality paper, or a combination of all three.</p>	<p data-bbox="653 1050 938 1214">Set your printer to "quality" rather than "speed" printing, use matt or textured papers, use the manufacturer's own ink cartridges, and do not reuse ink cartridges. Introducing a little noise into the image can also improve results.</p>
 <p data-bbox="101 1453 236 1474"><b>Dithered colors</b></p>	<p data-bbox="334 1274 619 1417">The image appears to be made up of fine patterns of colors arranged into bands. The image is "dithered," that is, a few colors are used in patterns to simulate a greater range of colors.</p>	<p data-bbox="653 1274 938 1349">Set the printer to print continuous tone, not dithered colors, and not graphics or poster colors.</p>
 <p data-bbox="101 1677 210 1698"><b>Poor details</b></p>	<p data-bbox="334 1498 619 1677">Fine details in the image appear blurred and hard to distinguish. Subtle changes in color appear banded or sudden. The printer is set to a low resolution, the image size is too small for the output size, or you are using textured paper or printing onto the wrong side.</p>	<p data-bbox="653 1498 938 1641">Use an image size adequate for the printed, output size. Set the printer to highest quality. Use paper with a smooth or glossy surface suitable for your printer, and make sure you use the correct side.</p>