

Camera movements are adjustments in the relative positions of the lens or film, used to control focus, perspective, and the position of the image in relation to the film. The actual movement procedure varies from camera to camera. Sometimes the entire standard moves, and sometimes only the lens board or the back moves. Generally there are positioning knobs that loosen and lock the movements in place. Most view cameras allow for a lot of lens movement, but some have limited back movement. On many cameras there are click-stops or degree scales to help measure the exact amount of movement.

This section describes the effects of camera movements upon the image. However, it is important to understand that controlling the movements means far more than simply following a few rules. Every situation is slightly different, but you can always depend upon the accuracy of ground-glass viewing. After each movement, check the ground glass to see the results. If necessary, keep adjusting the camera until the desired effect is achieved.

The Rise, Drop, and Shift Movements

The rise, drop, and shift movements control the position of the image in relation to the file:

A *raised lens* has an effect similar to lifting the camera straight up; it moves the lens's projected image down on the ground glass (and, therefore, on the film) and reveals more of the top and less of the bottom of the subject (since the image is inverted).

A *dropped lens* has an effect similar to lowering the camera directly down; it moves the lens's projected image up on the ground glass and, therefore, reveals less of the top and more of the bottom of the subject.

A *raised back* effects the same basic change as a dropped lens.

A *dropped back* effects the same basic change as a raised lens. The shifting movements are horizontal versions of raising and dropping the lens and the back.

A *lens shift* to the left has an effect similar to moving the entire camera to the left; it slides the lens's projected image to the right on the ground glass. A lens shift to the right has the same effect as moving the camera to the right; it slides the lens's projected image to the left on the ground glass.

A *back shift* to the left effects the same basic change as a lens shift to the right; a back shift to the right has basically the same effect as a lens shift to the left.

When the lens is raised, dropped, or shifted, there is also a minor change in the viewpoint of the image. Imagine the lens is first aimed straight at the subject. If the lens is then raised, the point of view will be from a slightly higher position. When the camera back is moved, the point of view does not change. The difference is small and may be insignificant (certainly smaller than the effect of moving the entire camera). But you may choose to raise, lower, or shift the back instead of the lens to avoid this viewpoint change.

Sometimes the rise, drop, and shift movements are used for minor changes. For example, you may set up the camera in zero position, view the image, and decide to include a little more of the top of the subject. Rather than raising the entire camera (by raising the tripod) or pointing the camera up (which would alter the shape of the image—see the next section), you can simply raise the lens or drop the back.

For more significant changes, you may choose to move both the lens and back. For example, you may want to photograph a building, but if you shoot it at zero position, the top of the building will not be included on the ground glass. Raising the lens will include more of the top, but possibly not enough. So raise the lens and drop the back to effect a greater movement.

Also, you can circumvent interfering elements by moving the entire camera, and then using the rise, drop, or shift movements. For example, imagine you want to photograph a wall, straight on, with a mirror in the center. If you set the camera at zero position, pointing directly at the wall, the mirror will reflect the camera. So, move the entire camera to the right, out of the view of the mirror, and shift the lens to the left and the back to the right to circumvent the reflection.

The Tilt and Swing Movements

The lens or back can be tilted or swung toward or away from the subject. Imagine horizontal and vertical axes crossing through both the lens and the back. *Tilting* refers to rotating the lens or the back about its horizontal axis; *swinging* refers to rotating the lens or the back about its vertical axis.

The tilt and swing movements are the most difficult to understand and control. With the rise, drop, and shift movements, the lens and back always remain parallel to each other. However, with a tilt or swing, the lens and back are no longer parallel, thereby causing important changes in the shape and focus of the image.

The Back Controls Shape (or Perspective)

The shape (or perspective) of an object can be changed by tilting or swinging the camera back. Imagine pointing a camera straight up at a tall, rectangular building. Because of perspective (the size of an object diminishes with distance), the top of the building seems smaller than the bottom. The building's vertical lines converge, and its shape resembles a trapezoid rather than a rectangle. The amount of convergence is dependent upon the angle of the camera back to the object. When the camera is pointing up, the back is at an angle to the building. As you increase that angle, the convergence becomes more pronounced; as you decrease that angle, the convergence becomes less pronounced.

One of the most common uses of camera movements is to eliminate convergence by tilting or swinging the camera back, so the object and the back are parallel. When the camera is pointing up at a building, tilt the back forward to straighten out the converging vertical lines. Or, imagine photographing a horizontal building, located at an oblique angle to the camera. The top and bottom lines of the building converge horizontally. To correct this convergence, swing the camera back so it is parallel to the building.

Tilting or swinging the back will alter the image's focus, due to the change in the relative film-to-lens positions. To put the image back into focus, tilt and/or swing the lens in the same manner as you moved the back, so that the lens and the back are again parallel.

Or, you can alter the lens to conform to the Scheimpflug Principle, explained on pages 211–212 of *Beyond Black and White Photography* (Little, Brown and Company, 1977). Notice, in the illustration below, that when the back is tilted at a greater angle to the building to increase convergence, the entire building, despite the tilt, is in focus.

The Lens Controls Focus

The apparent focus of an object can be controlled by tilting or swinging the lens. The *plane of sharpest focus* of an object is the plane that travels through the focal point (on that object), parallel to the lens standard. Imagine a camera in zero position, focused on a wall that is parallel to both the lens and the back. The wall represents the plane of sharpest focus; the entire wall will be equally in focus. The depth of field will extend in front and in back of the surface of the wall, parallel to the plane of sharpest focus. However, if the wall is located at an angle, rather than parallel to the lens and back, to guarantee maximum focus you must change the plane of sharpest focus by swinging the lens in the same direction as the wall. This phenomenon is based on the Scheimpflug Principle, which states:

When the planes of the lens, the film, and the subject are extended and meet at a common point, the subject will appear in maximum focus.

Generally, to increase focus, you tilt or swing the front. But tilting or swinging the back may also mean the planes of the lens, the film, and the subject will all meet at a common point (see the illustration above). However, tilting or swinging the back also creates a change in the object's shape, so unless that change is desired, always tilt or swing the front to increase the focus.

In Summary

The rules of tilting and swinging the camera back and lens can be confusing. Here are the main points to remember:

1. Tilting and swinging the camera back controls the shape or perspective of the object. When the back is parallel to the object, there is no apparent convergence; when the back is tilted or swung away from the object, the vertical or horizontal lines of that object seem to converge; the greater the angle between the back and the object, the greater the convergence.
2. Tilting or swinging the lens controls the apparent focus of the photograph. Maximum focus is achieved when the planes of the lens, the film, and the object are all parallel to one another; or when the planes of the lens, the film, and the object—when *extended*—*all meet at a common point*.

Movements and Covering Power

At zero position, the center of the film is located directly in back of the center of the lens (and presumably within the center of the lens's covering power). Any adjustment (except possibly tilting or swinging the back) could cause the film to move outside the covering power of the lens. Furthermore, with extreme camera movement the bellows may actually block the light traveling to the film. Either way, the result will be a negative lacking in sharpness or density at its edges.

You can identify poor coverage or bellows interference by a careful inspection of the corners of the ground glass. On some cameras, the corners of the ground glass are clipped off. You should be able to see a spot of light coming through each corner. If any corner is dark, the light is blocked off because of inadequate lens coverage or bellows interference.

From *Beyond Black and White Photography*, Little, Brown and Company, 1977.