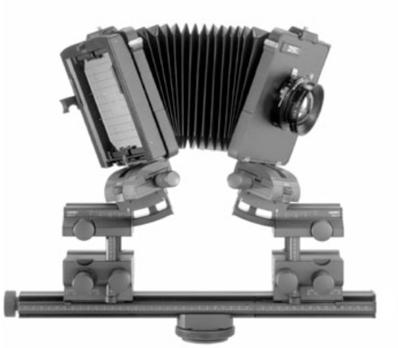


View Camera Movements and Techniques

View Camera Movements

A view camera's movements, front and rear standards, provide for the ability to change and control an image, including image placement, planes of focus and perspective. The movements of a view camera include:

Rise and Fall

Shift

Tilt

Swing

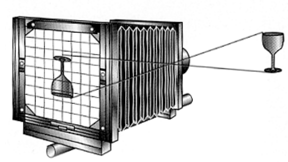
see *Chapter 14 – View Camera* **in Photography, 8th edition** (London)

Rise and Fall

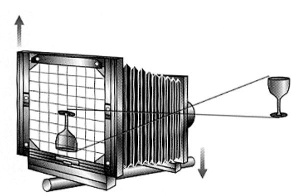
Rise, an upward movement, and **Fall**, a downward movement, control the vertical placement of the image on the ground glass. This can be accomplished by moving either the front or rear standards.

Rise or fall of the rear standard does not affect the shape of the subject, giving the option of moving the object within the frame without changing the position of objects relative to each other.

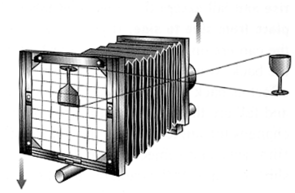
The rise or fall of the front standard changes the point of view and to some extent the shape of the subject and visual relation of objects.



Standards Zeroed



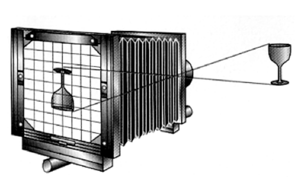
Back rise / Front fall



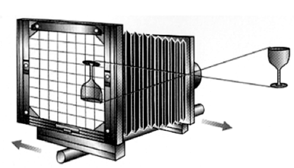
Back fall / Front rise

Shift

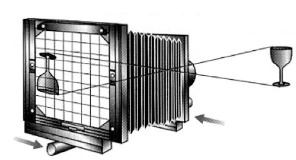
Shift, a sideways movement, is the same as the rise and fall of standards except the movement takes place from side to side. Spatial relationships change with a shift of the front standard and not the back standard.



Standards Zeroed



Back shift left
Front shift right

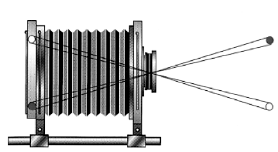


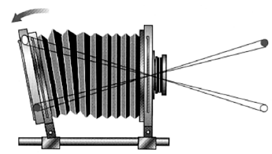
Back shift right
Front shift left

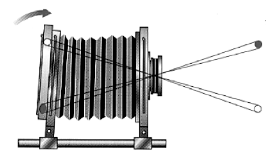
Tilt

Tilt, a forward or backward angled movement of either or both the standards, can change both the shape and the focus of the image on film.

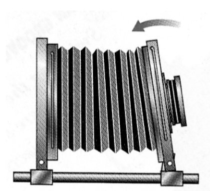
Tilting the rear standard changes the object shape. The light must travel farther from the lens to reach the top (or bottom) of the film plane, depending on the direction of the back tilt. As light rays travel, they spread apart and increase the size of the image on the top (or bottom) of the film plane. The farther the image travels inside the camera, the larger it gets.

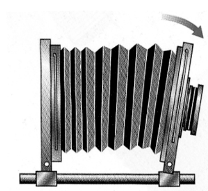

Standards Zeroed


Back tilt towards back


Back tilt towards front

Tilting the front standard changes the focus. With a front standard tilt, there are no changes to the image size or shape, but it does affect the focus by altering the len's relationship to the film plane. Tilting the lens can relocate the plane of focus.

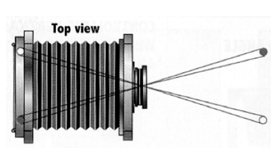

Front tilt towards back


Front tilt towards front

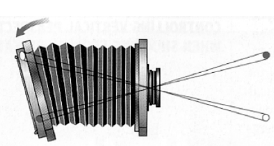
Swing

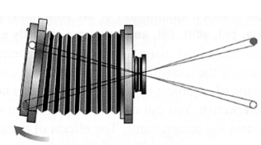
Swing, an angled left or right movement of either the rear or front standards, can change the shape and/or focus of the image.

Swinging the rear standard changes the shape. Similar in effect to tilting the rear standard, a swing of the rear standard will reduce the size of an object on one side while enlarging it on the other.

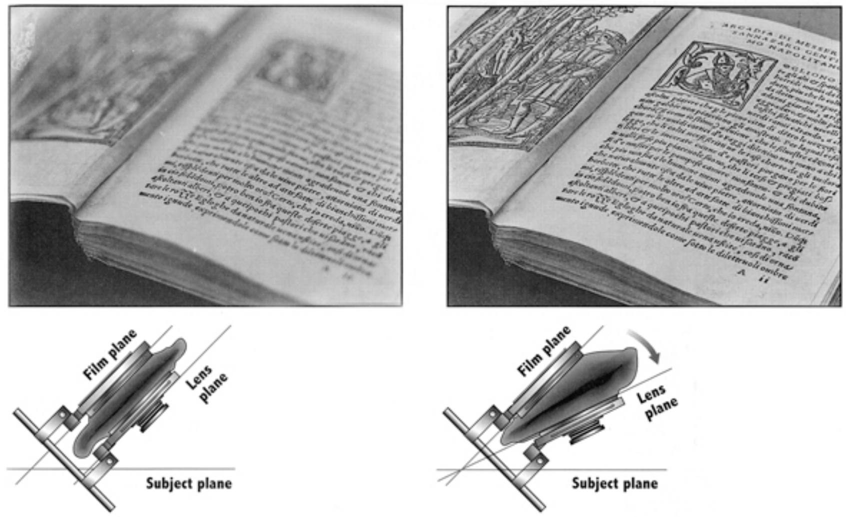


Standards Zeroed


Back left swing


Back right swing

Swinging the front standard changes the plane of focus. The general effect is to move the defined zone of focus that is normally parallel to the film plane into a new position where it cuts across at an angle to the object.



Plane of Focus and the Scheimpflug Principle

In order to control the plane of focus when the film plane and lens plan are not parallel to the subject plane (left image), **tilting or swinging the lens plane (so it converges in line with the film plane and subject plane) will provide for sharp focus across the entire film plane** (right image).

Controlling Perspective

Controlling perspective is one the key advantages in using a view camera, particularly for architectural photography. Sometimes standing level and shooting straight will not provide for enough of the building to fill the frame and depending on the vantage point (point of view), it may be necessary to tilt the camera up or down.

Vertical Plane

However, while tilting the entire camera up may show the entire building (or object with vertical lines), it will also cause a distortion of its shape. Known as the **keystone effect**, the vertical lines will seem to come closer together, or converge, near the top of the frame.

In order to straighten converging vertical lines, it is necessary to tilt the rear standard of the camera parallel to the face of the building (or object with vertical lines). It is also necessary to make the front standard parallel to the rear standard to maintain focus.

Horizontal Plane

Photographing a building (or object with horizontal lines) may also cause the convergence of horizontal lines towards one side of the frame, producing an exaggerated sharp angle called the **ship's-prow effect**.

In order to straighten converging horizontal lines, it is necessary to swing the rear standard of the camera parallel to the face of the building (or object of horizontal lines). It is also necessary to make the front standard parallel to the rear standard to maintain focus.

A summary of the view camera's movements is attached and can also be found in *Chapter 14 – View Camera, page 320* in **Photography, 8th edition** (London).

Exposure Compensations

Bellows Extension Factor

As the lens is moved closer to the subject, the bellows between the front and rear standard must be proportionately extended in order to focus the subject onto the film plane. **The bellows extension is the distance between the front standard and the rear standard**. There is a precise relationship among the 3 elements of bellows extension, lens focal length, and exposure. Whenever the bellows extension (measured in mm) exceeds the focal length of the lens, the exposure is reduced (less light striking the film plane).

The bellows extension factor is the measure of the necessary exposure compensation.

$$\text{Bellows Extension Factor} = \frac{\text{(Bellows Extension in mm) squared}}{\text{(Lens Focal Length in mm) squared}}$$

For example, with a bellows extension of 210 mm and a lens focal length of 150 mm, the bellows extension factor would be 2.0.

$$\mathbf{2.0} = \frac{\mathbf{210^2}\ (44100)}{\mathbf{150^2}\ (22500)}$$

A bellows extension factor of 2.0 would result in a 1-stop adjustment with the exposure (opening up the aperture or decreasing the shutter speed by 1-stop to compensate for the loss in exposure).

The following chart lists common large format focal lengths, bellows extension lengths and bellows extension factors:

		Bellows Extension in mm and Bellows Extension Factor								
Focal Length	Inches	**120**	**150**	**180**	**210**	**250**	**300**	**350**	**400**	**450**
90	**3.5**	**1.8**	**2.8**	**4.0**	**5.4**	**7.7**	**11**			
135	**5.3**		**1.4**	**1.8**	**2.8**	**3.6**	**5.4**			
150	**5.9**			**1.4**	**2.0**	**2.8**	**4.0**	**5.4**	**7.1**	**9.0**
180	**7.0**				**1.4**	**2.0**	**2.8**	**4.0**	**4.6**	**6.0**
210	**8.26**					**1.4**	**2.0**	**2.8**	**3.6**	**4.6**

25.4 mm = 1 inch

Factor	Stops To Open
1.4	**1/3**
1.8	**2/3**
2	**1**
2.8 – 3	**1-2/3**
4	**2**
5	**2-1/3**
6	**2-2/3**
8	**3**

Reciprocity Failure

The Law of Reciprocity is the theoretical effect on exposure in which the relationship between the length of the exposure (time = shutter speed) and the intensity of the light (amount = aperture) is balanced. An increase in one will result in a decrease in the other by the same amount.

However the law does not hold true for very long or short exposures. Reciprocity failure, or the failure of the reciprocity law, is a diminished film speed that causes underexposure unless the exposure is increased.

In calculating reciprocity failure, it is first necessary to calculate light losses such as filter factors and bellows extension before figuring the reciprocity failure.

A film's reciprocity characteristics are usually available from the manufacturer. In considering reciprocity failure with long exposures, it is helpful to bracket exposures. The following guide provides exposure and development compensation factors:

Indicated Exposure	Open Aperture **or**	Increase Exposure **&**	Decrease Development
1 second	**1 stop more**	**2 seconds**	**by 10%**
10 seconds	**2 stops more**	**50 seconds**	**by 20%**
100 seconds	**3 stops more**	**1200 seconds**	**by 30%**