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Introduction to panoramic, peripheral and scanning photography

Andrew Davidhazy

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Andrew Davidhazy
School of Photographic Arts and Sciences
Imaging and Photographic Technology Department
Rochester Institute of Technology
One Lomb Memorial Drive, Rochester, New York 14623

Photography is generally assigned some measure of truth with respect to the image ultimately viewed by an observer. This is may be traced back to the beginnings of photography. From then until today it is widely accepted that images displayed as photographs exist because at some time the object being depicted actually existed in the form shown by the photograph.

To add to the perception that photography is a reproduction of real events, the fact that we refer to the shutters of our cameras as having made images that record a "slice" of time, that they are "instantaneous", that they produce images we call "snapshots", has simply fueled the belief that photographs are realistic representations of subjects as they looked when photographed.

This situation would not have much significance in the context of this presentation if all we had available for shutters were "leaf" or "diaphragm" shutters. These type shutters do, in fact, support most of the above statements with respect to the instantaneous nature of photography.


Actually, however, a large number of photographs is made with cameras fitted with focal-plane shutters. These present the photographer with interesting possibilities especially when one is making images of objects in motion. We may experience "focal plane shutter distortion" if the image of our subject moves with respect to the film plane while the shutter slit travels across the film plane. Henri Lartigue's photograph of a speeding racecar is a prime example of this type of distortion. Robert Doisneau's photograph of intertwined dancers is an example of a situation where the scanning action of the shutter was intentionally slowed down.

Focal plane shutters are designed to move while the film remains stationary. There is a large number of specialized cameras that depend on making images by reversing the process and they move the film while keeping the shutter slit stationary.

Unlike standard photographic situations where we strive to make the subject remain still during the exposure, when using these cameras it is imperative that the subject move. If subject remain stationary then all the final record will show is a series of streaks and so sometimes these cameras are called streak cameras.

Generally therefore, in these cameras, called by many different names, the ultimate objective is to move the film in the camera past the open, stationary slit of the shutter, at the same rate as the image of the subject moves across the slit.

There are many ways to improvise and experiment with images and cameras that operate based on this principle. A simple camera can be made by modifying a standard, manual, 35mm camera by installing a mask in the film gate and leaving a narrow slit in the middle of the frame. Then, the camera is loaded and while the lens cap is on, the film is advanced one frame at a time until the end of the roll. Then the camera is placed on a firm support and aimed at an area where some action is likely;y to happen. The shutter is then locked open, the rewind button is depressed, and the film is rewound into the supply cassette.

As the film is rewound past the open slit it gets exposed. The degree to which the film speed of motion matches the rate at which the image of subjects moves determines how free of distortion the pictures will be. Since one can not match speeds accurately for all part of most subjects there will be some distortion all the time. This makes the pictures somewhat unusual and sometimes quite interesting. They are made over time but viewed at a single time. Our visual perceptual system gets confused.

To make sure the film is being moved at about the right rate, simply time how long it takes a subject to across the viewfinder of the camera. Multiply this time by 1.5 and this is how long it should take you to turn the rewind know once. The exposure time is governed by how fast you turn the rewind knob and the size of the shutter slit. Assuming you make the shutter slit about 1mm in size, the exposure time will be equal to the time required to turn the rewind knob once divided by 50.

Once you know the exposure time associated with a given rate of turning the rewind knob, you simply take a light meter reading and determine what f number goes along with that exposure time. This should produce acceptable exposures and interesting images.

Several popular applications of this type of photography will be discussed in the presentation. Among them is the application in scanning panoramic cameras and that of peripheral photography.

There has been a resurgence recently in interest in panoramic photography, both in the area of traditional photography and in the realm of electronic imaging. While there really is no clear cut definition of what a panoramic photograph is, photographers have been quietly making them in all kinds of ways. Ultimately any photograph that has one dimension significantly larger than another is usually called a panoramic photograph.

Among the earliest panoramic cameras of the type described above is the Cirkut camera, introduced by Eastman Kodak in the late 1800's and which was available in a wide variety of film sizes. Modern cameras of similar design include the Hulcherama, the Alpa Rotocamera, the Panalux or Roundshot and the Globuscope.

Panoramic records made with "cirkut" type cameras are made by rotating the camera about a vertical axis thus scanning the scene in front of the camera in sequential fashion. The film, moving behind an open slit shutter, accumulates the changing image information presented to it by the scanning camera and eventually builds up a record on a length of film containing a view of any desired angle even up to (or beyond) 360 degrees.

For the record to look sharp the camera must move a length of film equal to 2pi times the lens focal length during the time for one revolution of the camera.

Related to the panoramic camera, the peripheral camera is not as well recognized in either the literature or in terms of working models. The cause for this lack of recognition for peripheral photography is probably due to the fact that this application is somewhat more specialized. It is interesting to note, however, that the making of peripheral photographs, sometimes called cyclographs, of Greek and Mayan pottery, has been practiced since the late 1800's in a number of major museums and also in industrial situations.

Peripheral records of the surface of cylindrical subjects can be easily made by rotating the subject in front of the camera. The film in the camera is made to move at right angles to the axis of rotation of the subject and in the same direction as it's image. The slit restricts the angle of view along the axis parallel to film motion to a very narrow angle, thus it encompasses only a small portion of the cylindrical subject's surface. At the slit, then, the image of the subject's surface appears to simply pass by sequentially. The film velocity is set to match the value given by the subject's surface velocity multiplied times magnification.

Finally, the other two variations on the above themes, that of racetrack photofinish cameras and that of aerial strip cameras, apparently complete the applications circle of those cameras which make more or less realistic records by moving a length of film past a slit and capturing the image of the subject by making it's image travel across this slit at the same speed as the film. In effect, in these cameras the image scans itself onto the passing film by virtue of the camera's motion.

In these "linear" type cameras, the film is simply made to move at the expected velocity of the image. In racetracks the camera is fixed and the image of the racers passes over the slit in the camera. The film velocity is adjusted to approximately match the expected velocity of the images of the subjects. In aerial cameras, the plane moving with respect to the ground below causes a moving image to pass by the slit of the camera. The film speed is again adjusted to match that of the passing image.

Generically all of these cameras or systems can be labeled as variants of "strip" recording cameras and can be called simply "strip cameras". Examples of images made by each of these approaches are shown in the illustration below.

From top to bottom: a 360 degree panoramic photograph with characteristic distortion; b) partial peripheral photograph of automobile tire surface; c) typical photofinish photograph where print is line as a function of time; d) moving strip camera sees subjects head-on and thus building sides are not visible.

If you have questions or want to discuss any aspect of panoramic, peripheral or strip photography in general fee free to write to me right HERE or later at andpph@rit.edu.