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Panoramic Cameras I've Made

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My experiences with strip-type camera construction started in the mid-1960's and I started to do panoramic photography in the latter half of the 1960's while still an undergraduate student at R.I.T. and while involved with exploring the photographic possibilities of moving film type cameras generically known as "strip" cameras. I first learned of the pictorial applications of these cameras from the work of Life magazine's George Silk and his coverage of the 1960 Olympics with a camera modified for him by Marty Forsher.

The first panoramic camera I built consisted of a mechanism for rewinding the film in a standard 35mm camera while the camera was manually panned at a rate controlled by the focal length used on the camera. The longer the lens the slower the pan for a given rewind speed. I took an approach to determining the length of film required for a full 360 degree shot which was, and remains, rather unorthodox. Instead of using the traditional formula of 2 x f x pi I divide the vertical angle of view of the lens in use into 360 and multiply this figure by 24mm. While normal focal length lenses require similar lengths by each method it was not until I came in contact with Cirkut photographers that the advantages of the previous method became evident.

The strip camera and bracket seen here were completed in the late 1960's and soon the bracket was riding on a home-built rotating tripod head made out of part from an old print dryer. The image seen here was made with a 19mmm lens fitted to the camera and covers in the vicinity of 160 degrees. I took this camera to Argentina, Mt. Rainier, and many places around the States. You can see other pictures made with this basic system (which I still very much use for both panoramic and peripheral photography) in my EXHIBITS site.

At the same time that my interest in panoramic photography increased I started to experiment with enlargments. In 1970 I made a 360 degree 32 feet long print from a panoramic photograph made with a 35mm focal length lens on the above camera turned by a battery driven rotating tripod head made for it. The print was made in two 16 foot sections projected by a masked down carrier in a 4x5 enlarger. It was 40 inches wide and when displayed it hung from a wooden hoop 10 feet in diameter under whose edge the audience had to "duck" in order to enter the city scene which was augmented by city sounds from a continuously repeating cassette recorder. My first experiments were published in the September 1969 issue of Popular Photography magazine.

Subsequently I designed and built a "strip" enlarger capable of moving the film at the enlarger head and the paper at the easel. I motorized the drive rollers from a Polaroid Pronto! camera to move the film and slowed down a 18" Ektamatic processor to drive the paper. Both the film and paper were driven by DC motors and I matched the speed of the paper to that of the enlarged image by simply varying the voltage to the paper drive so that the paper would appear to move at the same rate as the film's grain pattern. To easily visualize paper speed I placed ink marks on the paper just previous to its passage past the image of the exposing slit at the easel. Soon I was making enlargments on 10" wide paper which exceeded 50 feet in length.

I continued working in panoramic and other applications of "strip" type cameras and my activity was reported again in the June 1980 issue of Modern Photography. As a result of this article I received a letter from Alan Zinn of Michigan who issued sort of a challenge by stating that he had designed a camera that used no motors or gears. The photographs he sent me were very good indeed!. I decided to look into alternate designs as a result. The outcome was a camera that at least partially met the challenge

I modified an Agfa Silette body by fitting it with a 19mm Canon lens and adding a rubberized wheel to its film advance shaft. This external wheel contacted the inner surface of a circular depression cut into a wooden base with a lathe. The diameters of the camera wheel and the cylindrical depression within which it rode were proportional to the circumference of the film advance sprocket and the amount of film which the 19mm lens required for a complete panoramic photograph. Given that the location of the tripod socket of the camera (the point about which the camera rotated) and the shaft of the film advance sprocket were fixed, only one set of wheel/circle diameters would allow the two to continually remain in contact as the camera turned. Thus, turning the camera also advanced the film and during one 360 degree revolution exactly 19 x 2 x pi or 119mm of film passed through the camera. Since the slit was fixed at 1mm, the exposure time was always a function of how fast the camera rotated

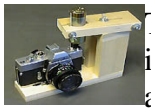
I have used this camera ever since (shown above being manually rotated in front of Treasure Isalnd Hotel in Las Vegas) and presently it is further modified with a rising and falling lens mount so that the horizon location can be placed as close as 2 mm from either edge of the negative. That is, the lens can be raised or lowered 10mm off axis

The camera has been a lot of fun to use and even though it is capable of being motor driven, it is most fun to use when I turn it by hand and get myself included in each panoramic photograph.

A recent development, which was reported at the IAPP meeting in Las Vegas, is a novel panoramic camera in which the film traverses a circular path rather than moving in straight linear fashion as in standard panoramic cameras. This design takes care of the blurring that some panoramic photographers experience with the "Goldbeck Wedge", which causes the image to travel at different speeds at oine side of the slit of the camera compared to the image speed at the other side. This "conical" panoramic camera is able to deliver 360 degree photographs in which the top is slightly shorter than the bottom thus allowing a print to assume a conical, rather than cylindrical, shape. The examples above include the George Eastman House in Rochester, NY and a New York City cityscape in the vicinity of Madison Square Garden.

The images produced by the camera can be used directly as conical lampshades, novelty hats or any other conically shaped article on which it is desired to show a full undistorted panoramic view. You can read a more complete description of how this camera came about and the mathematical relationships that govern its use (and, in fact, that of all panoramic strip cameras) in the paper Camera for Conical Peripheral and Panoramic Photography which was presented at the 1990 Convention of the SPIE, the International Society for Optical Engineering.

Recently I have started to experiment with digital, linear array, CCD cameras through the generous assistance of the Dalsa Corporation and Phase 1. While not as much fun as "home-made", basic, inexpensive systems I generally work with, these devices have opened up novel applications and presented yet another view on strip camera systems.



Throughout my work in the area of strip cameras it has always been my intention to develop systems which the amateur could experiment with without altering or ruining expensive personal equipment. With this in mind, I finally designed a simplified rewinding bracket which can be built with simple hand tools at a minimum of expense. This bracket, to some extent resembling a $ 400 Sugawara Film Streak V rewinding bracket available from Japan, will allow most any photographer to explore panoramic, peripheral, photofinish, and a variety of other applications in the exciting field of "strip" photography

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