Cameras Everywhere

Lots of Platforms

In the late '80s and '90s, producers and directors began to use miniature POV (point of view) cameras to capture unique views unavailable even to the best seats in the house. Cameras over baskets and goals, in race cars, blimps, helmets and cranes transformed sports and entertainment venues into huge television studios where the live audience sees and hears much less than the home viewer. Camera angles generally got lower and closer to the action. Instead of simply looking down on an event, the producer tried to get cameras in locations that would allow the director to weave a story out of any drama involved in the event.

Figure 4.44 *In almost every case, there must be camera locations that are above the action. For many productions, the easiest way to get a camera above the action where there isn't already a platform is to rent a lift. Although, if the need was frequent enough, an entity like Japan's NHK might own their own.*

Figure 4.45 *Even the large studio cameras may find themselves on movable platforms, or at locations thousands of feet from the truck.*

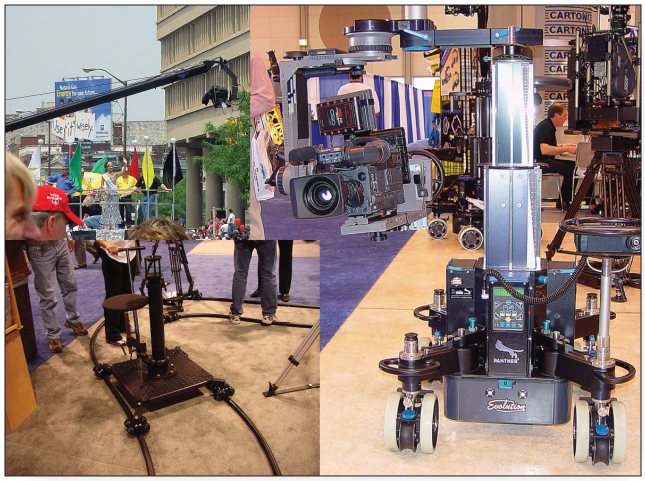


Figure 4.46 Today there are many ways to get a camera around and place it near, under or over the action. The camera dolly on the right can place the camera just above the ground or many feet in the air, and allows for rotation of the camera off horizontal. Complex camera moves can be programmed and executed while the whole platform moves along the ground or on a track.

Figure 4.47 Cranes developed mainly for film, but adapted for some television productions, have been around for 50 years.

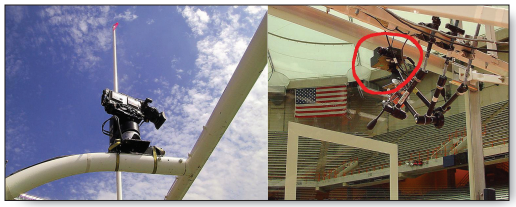


Figure 4.48 *Point of view (POV) cameras. Left camera sits atop a football goal post, and the other (circled in red) is a small camera on the back of a basketball backboard. Below and behind the camera is its spidery tripod assembly, which is clamped to the backboard frame. Both cameras are remote controlled from the truck compound.*

Figure 4.49 *Other platforms include this 30-foot indoor blimp, which can be used outdoors if the winds are under 20mph. The Rollvision camera container is below. The system on the right is Rollvision on a camera stabilization head, which removes pitch and roll and thus automatically maintains camera horizontal. This system could be used onboard a boat, on an off-road vehicle or even on an aircraft. It mounts between the tripod and the pan/tilt head.*

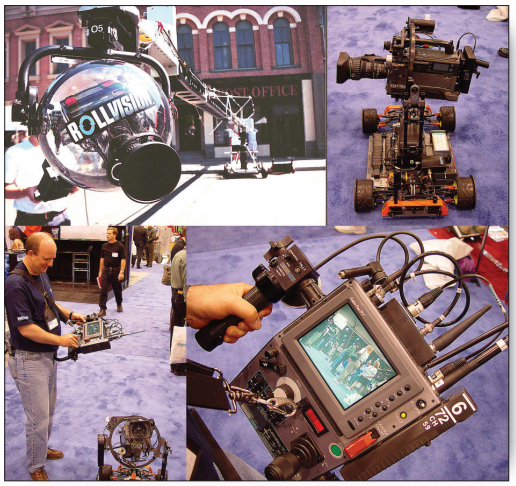


Figure 4.50 *A number of companies have based a large part of their business model on getting those camera shots that make us wonder how they did that. One such company is Rollvision. Upper left is the company's basic package, which weighs 16 lbs. and allows the contained camera to roll and pan 360 degrees and tilt 180 degrees. As shown here, it can be mounted on a jib or on other interesting mounts. Bottom right shows the radio remote control of the Rollvision assembly.*

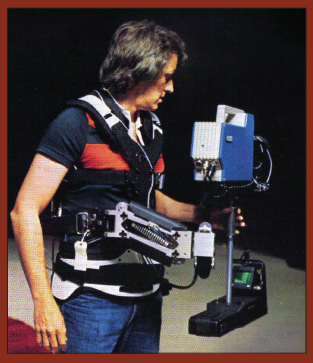
Figure 4.51 *An interesting platform is Rollvision's own Coptervision. This is a five-foot helicopter that does not require FAA permits. It travels up to 60mph forward and 45mph in reverse. It is intended for close-range aerial cinematography. To stabilize the camera in the Rollvision assembly, a three-axis gyro-stabilized camera mount is used that allows for 210 degrees of pan, 120 degrees of tilt and 360 degrees of roll. This flying platform can be controlled up to 1000 feet away and has a ceiling of 300 feet. For video operations, or just for shot composition in film use, the copter has a microwave downlink. With only a six-foot blade span, this tool would let a flying camera follow a car through a tunnel. But with two spinning rotors and 60mph speeds it is definitely not a toy. Thus, like a number of specialized camera platforms, you can only rent this one. Rollvision provides a crew with the rental that includes a pilot and a separate camera operator. (Source: Coptervision)*

Giving the Camera Legs

The art and science of moving a camera about probably got its biggest push from Garrett Brown. Brown, an artist, started his adult life as a folk singer, but an automobile accident sent his life in a new direction. He became a copywriter for a Philadelphia ad agency and soon became the agency's producer and produced a number of award-winning commercials. In 1969 he decided he wanted to start his own film production company. After a false start, he tried again with used gear he acquired from a bankrupt production company. One piece of equipment that Brown bought was an 800 Fearless Panaram cast-iron camera dolly. He liked the camera moves that the dolly could make, but not the task of lugging this substantial piece of equipment around in the field. He liked the 3-D sense that a moving camera gave to the 2-D film medium. Then Brown began to toy with finding a better way to move a camera smoothly through space. In particular, he wanted to eliminate the unwanted motions when a person carried the camera.

On his way to solving the human "shakiness" issue, he came up with a device suspended under a helicopter that allowed some interesting moving vehicle shots for a number of car commercials. From there he developed a "pole" cam. The pole rig was simply a pole with the camera at one end and a crossbar with a couple of weights at the other. Although it allowed for stable shots when carried along by the cameraman, the camera rose in elevation as the pole was tilted up. Brown next came up with a body harness made with bungee cords in conjunction with a number of pulleys that allowed the camera to be suspended off the shoulder. The main problem with this iteration was that it couldn't fit through tight places in a set.

In 1973, "Brown's Stabilizer" was born. It consisted of a harness worn by the operator that had a pair of hinged spring-loaded support arms that dampened the irregular movements of the camera operator, but not longer-term motion. In math/engineering terms it differentiated or filtered out quick and irregular motion, while integrating longer-term movement tendencies. The design was also clever because it distributed the camera and associated support mass as widely as practicable. This extended mass created a higher moment of inertia, which helped stabilize the camera. The camera end of the arm is mounted to a support pole via a gimbaled yoke (see Figure 24.9). Garrett took a demo reel made from his prototype to Cinema Products and an immediate deal was struck. Cinema Products bought and built his invention but renamed it "Steadicam".



Brown's demo reel found its way to many of cinema's marquee directors of the time. In a very short time, the directors of **Rocky**, **Bound for Glory** *and* **Marathon Man** *had hired Brown and his Steadicam.*

Figure 4.52 Inventor and artist Garrett Brown demonstrating a Steadicam with an RCA TK-76 in the late 1970s.

Figure 4.53 *A couple examples of the latest iteration of Steadicam. This system can be configured for over the shoulder or low to the ground camera shots. The spring-loaded arm, along with the long pole with camera mass at one end and the support electronics and monitor at the other end, creates a large moment of inertia. This is how the system produces smooth camera moves. But what makes Steadicam a powerful production tool are the artists that guide it around, and often through, the action being captured. Here are two Steadicam operators honing their skills at a Steadicam workshop. Between Garrett Brown, the late Ted Churchhill and a few other masters, about 2000 operators have been through "the system." Good Steadicam operators are an important part of a production, often called upon to help choreograph how a scene is shot, and the great ones are often considered on a par with the shoot's director of photography (DP).*

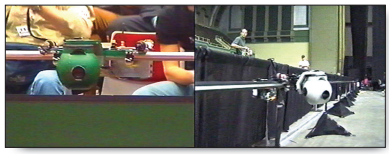


Figure 4.54 *The technology and brainpower behind Steadicam didn't stop there, as Steadicam inventor Garrett Brown and crew found other specialized camera platform and aiming requirements and filled them. Here is Railcam. This device allows a camera to race up and down a tennis court, or pace the participants in track. (Source: Steadicam)*

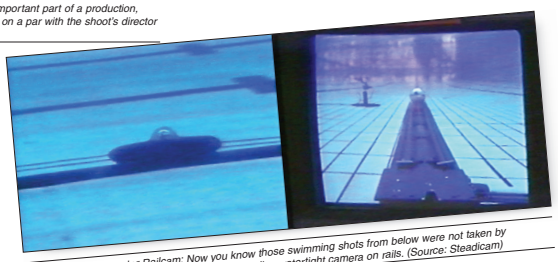


Figure 4.55 *Underwater Railcam: Now you know those swimming shots from below were not taken by cameramen in scuba gear, but by a flying saucerlike, waterlight camera on rails. (Source: Steadicam)*

Figure 4.56 *Another of Garrett Brown's early inventions was Skycam. First flown in 1983, and still under constant enhancement by Skycam's operator CF Inflight, it is a wire-supported, computer-controlled camera platform that flies through 3-D space. It can range over an area measuring more than a million square feet at speeds up to 25mph. Mounting points can be up to 1200 feet apart.*

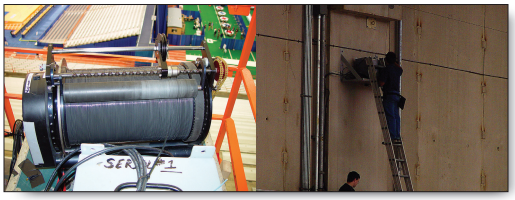


Figure 4.57 *Skycam anchor points are electromechanical reels that store up to 1300 feet of seven-layer Gore cable that includes a Kevlar member for strength, a single braid of copper conductor and a single-mode fiber optic strand. Although the line is rated for 600 lbs. of tension, max tension under operation is 60 lbs. To eliminate any shorting possibilities, a single polarity of voltage is sent down each cable for powering the camera and associated electronics. A local computer near each reel actually controls the reel based on commands sent by a central flight control computer. This local computer checks a number of reel parameters and stops the local reel, and also sends a stop command to the central computer if trouble is sensed. The central computer will also stop the system if each reel computer doesn't stay in constant communication with it. Often reels can be placed where they are easily accessible, but sometimes they can't. Therefore, the Skycam crew has at least one rigger.*

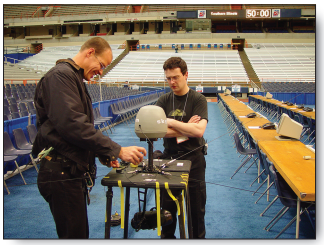


Figure 4.58 *Skycam undergoing preflight checks and adjustments. This part of the system, the actual camera platform, is called the Spar. It consists of twin coaxial graphite tubes that are gimbal-suspended. The top radome houses communications and camera pan/tilt servo electronics.*

Figure 4.59 *Skycam operation during the show consists of two people, with additional technical and logistical support standing by. The left operator controls camera zooming, focusing and pan/tilt. A control panel from CF Inflight installed in the production truck controls the camera's video levels. The person on the right is the pilot. He, in conjunction with the setup technical crew, enters coordinates as to ceiling, floor and flight boundary limits — in other words, the 3-D box that Skycam can fly around in. The crew also maps out no-fly zones inside the flight box, such as baskets and goal posts. During the show the pilot, via a central computer that orchestrates the operation of the four reels, flies the Skycam Spar through 3-D space. Every Skycam pilot is required to go to CF Inflight's training for certification to fly the system.*

Figure 4.60 *CF Inflight also offers a two-wire system that lets the camera fly at various heights in a straight line. The left photo shows the taping of a football's trajectory, from the football's perspective. (Source: CF Inflight)*