

The "Trolley-Cam" in O Scale

By Gary Reighn

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Watching your model scenery roll by from a cab's eye view has been most model railroader's dream. While this goal has been achieved with some success through a variety of means over the years, it has always suffered from a couple of disadvantages, including picture quality and cost. Today, microelectronics technology, high volume manufacturing techniques and microwave wireless capabilities have changed all of that. For under \$100 you can outfit a model railroad car with a high quality, wireless color video (and sound) camera capable of traversing your layout and providing a scale view of the landscape.

A year ago, one of the members of the East Penn Traction Club (www.eastpenn.org), John V. Gallagher, found an ad on the Internet for a camera called the XCam2 (www.x10.com). These small, color, wireless cameras are designed for use in security systems. John, being the quintessential tinkerer that he is, thought about other uses, especially given their incredible price of just \$79.99 (circa 2001). For that price you receive one camera, a 120VAC power supply and a receiver unit that attaches to your TV or VCR (see photo 1). For an additional \$19.99 you can purchase a battery pack (see Photo 2) which holds 4 AA batteries and snaps on to the bottom of the camera (Note, this battery pack is often included for free as part of one of the many promotions for the product). This replaces the standard camera power supply that requires 120VAC.

John promptly made a few slight modifications such as cutting the sides of the battery pack off so it would fit an O scale flatcar, and produced what we refer to as Trolley-Cam 1. John took the camera and battery pack virtually as they came from the supplier, rubber-banded them to a flat car, and proceeded to push the car around the layout with another trolley (see photo 3). The flat panel behind the camera is the antenna. Because of the wireless nature and use of the 2.4 GHz radio band, interference is minimized and picture quality is very good, especially compared with camera systems in the past that transmitted their signal via the rails.

To take the concept further, I wanted to try and improve on John's setup by providing a self-propelled vehicle for the camera. We also noticed that during operation on our modular layouts, when the car with the camera would round a curve, all you would see would be the great abyss at the edge of the modules. To improve the view down the tracks, I developed what we call Trolley-Cam 2 (see photo 4). The main features of Trolley-Cam 2 are its self-contained power trucks, its swiveling camera, and its repackaged batteries and camera electronics. By studying the photos of the camera as it comes from the supplier, you will see it contains a lot of unnecessary plastic designed to hold the components together and also protect them from the elements (the cameras can be mounted outdoors for surveillance use). To get everything to fit on my self-propelled car, I decided to shed some of that plastic. First to go was the box to which the camera itself was mounted. I carefully disassembled the box containing the camera's electronics and removed the circuit board. Where necessary, I used a cutoff wheel in a Dremel tool to cut a path to where the wires went through the plastic so I could remove the components without having to cut any wires. Once I had the pieces apart, I purchased a small "project box" from my local RadioShack® store to house the circuit board (see photo 5). I left the camera in its original plastic container, as it was small enough for what I wanted to do. It also included a convenient surface for mounting the camera to the car. However, you could disassemble the camera if you really needed a smaller footprint; say to enclose it inside a trolley car body.

I proceeded to do the same surgery on the battery pack. It should be noted that you cannot substitute any 6V battery pack for the one provided for the X10. The battery pack contains a small circuit board that modifies the voltage coming from the batteries for the camera. Leaving this out will undoubtedly ruin the camera. Again I used the cutoff wheel to remove the circuit board without cutting any of the wires. I also purchased a 9V style battery connector (see photo 6) that I soldered to the battery pack circuit board at the point where the battery contacts were. I then obtained a battery pack that holds 4 AA batteries (see photo) that would fit my application. I kept the on-off switch from the original battery pack so I could control the camera's power when it wasn't in use.

To create the car on which everything would ride, I used a simple piece of basswood as the floor, cut to the rough dimensions of a typical interurban car. The floor needs to be long enough to hold the camera, camera electronics and antenna, and the battery box and its circuit board. For trucks, I grabbed the closest set of available O scale trucks I had, a pair of can-motored Q-Car trucks. To achieve the desired effect of having the camera follow the rails when the car rounds a curve, I mounted the trucks with the bolster oriented from front to back instead of from side to side (see photo 7). I then formed a U shaped bracket out of brass and soldered it to the existing mount on the

trucks. A hole at the top allowed me to mount the camera to the bracket using its existing mounting post. As the truck turns to follow the track, so does the camera. While swiveling the camera in this manner does improve the view, some sort of gearing or levers that move the camera even further in the direction of the turning trucks would be better still. But that is another project!!

Needless to say, the Trolley-Cams have been a huge success at shows. Nothing shows off your scenery than seeing it at a scale height from a trolley car moving through the layout. Kids of all ages enjoy watching the scenery go by and occasionally catching glimpses of themselves on the television set provided for public viewing. At the Fall Trolley Extravaganza in King of Prussia, Rich Kerr (owner of yet another trolley cam setup) provided a different perspective by placing his flatcar-mounted camera behind a gondola pulled by a freight motor. This gives the very effective impression of a view from someone actually riding in the gondola (see photo 8).

Using your VCR, you can actually record the output of the camera on videotape and provide your friends and relatives with a recorded tour of your layout. Remember, the camera includes a microphone so it picks up all the track and truck noises (and people noises!) as the car moves. Of course with the proper equipment, you could always dub some prototype sounds and make a very convincing movie! To see the camera in action you will find a few seconds of video taken from Trolley-Cam1 on the East Penn Traction Club's web site at www.eastpenn.org/photos_x10.html. This video was recorded at last Christmas' Greenberg's Train Show on the East Penn's O scale modular layout.

We are now waiting for someone to incorporate the camera completely within a model trolley body. We also hope to see some uses for it in the smaller scales. With the low entry fee for this type of capability, the possibilities are endless.

P.S. The www.x10.com website in their X10-Zone section regularly recognizes unusual and interesting uses for its innovative products. The East Penn Web site's display of the use of the XCam2 for model trolleys (www.eastpenn.org/x10cam.html) was chosen for their "X10-Zone Story of the Year - 2000". Here is the quote from their web site: "We've chosen this user-profile about the East Penn Traction Club as the "X10-Zone Story of the Year - 2000" due to the great application, photos and video submitted! Thanks East Penn! Read the full story at http://www.x10.com/news/articles/1229_trolley.htm - submitted 12/29/2000"



Photo 1 – The XCam2 camera unit and receiver.



Photo 2 – The XCam2 battery pack.



Photo 3 – John V. Gallagher's original Trolley-Cam mounted on an O scale flatcar and pushed by a freight motor.

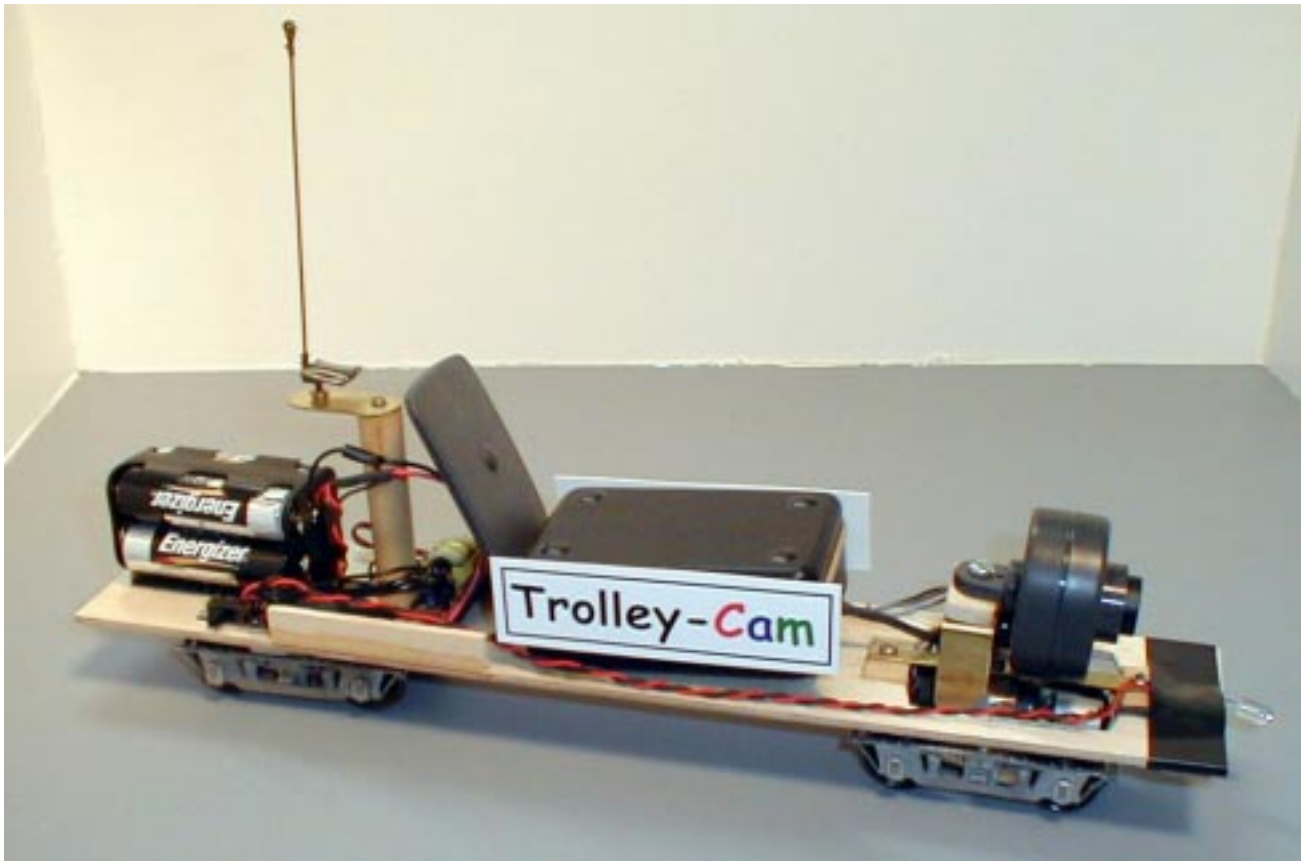


Photo 4 – Gary Reign’s self-propelled Trolley-Cam2.



Photo 5 – This view shows the camera circuit board mounted in its new, smaller box. The flat panel sticking up behind the box is the antenna.

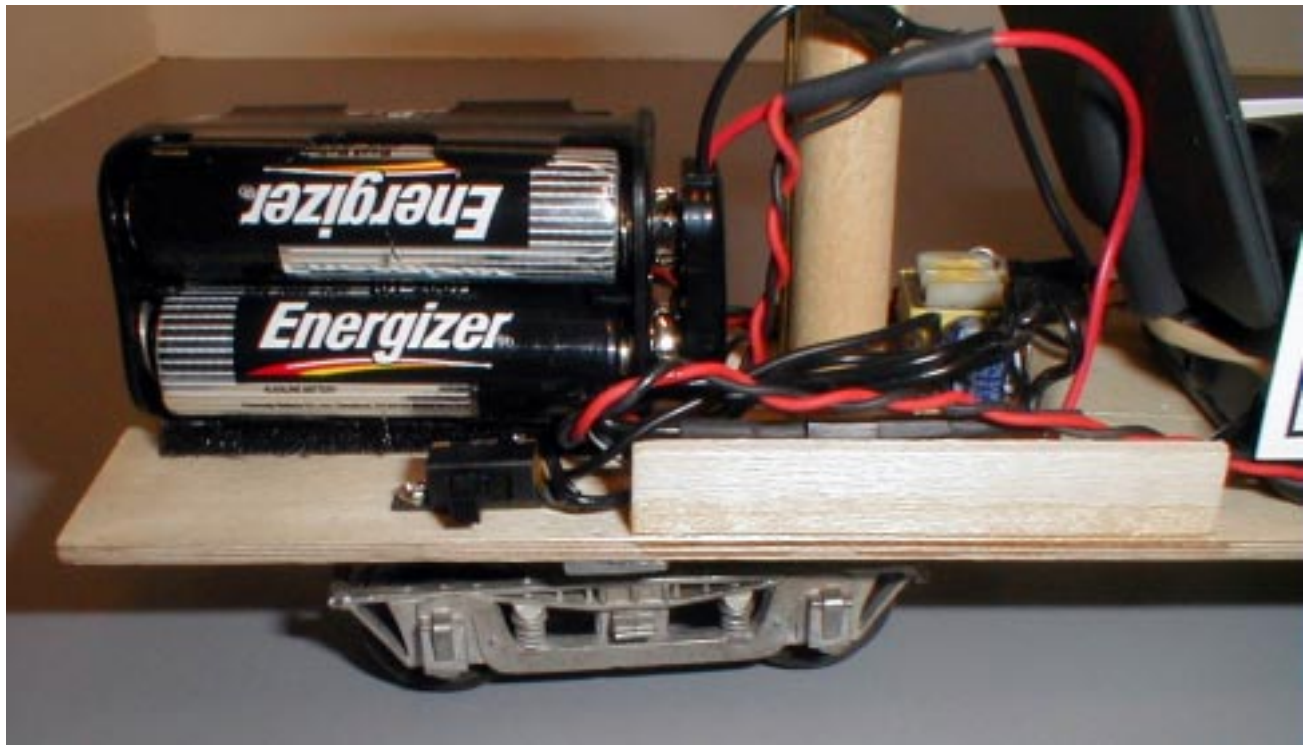


Photo 6 – The battery pack and battery circuit board (just ahead of the wooden post) are visible in this shot. Notice the salvaged on-off switch mounted to the car.

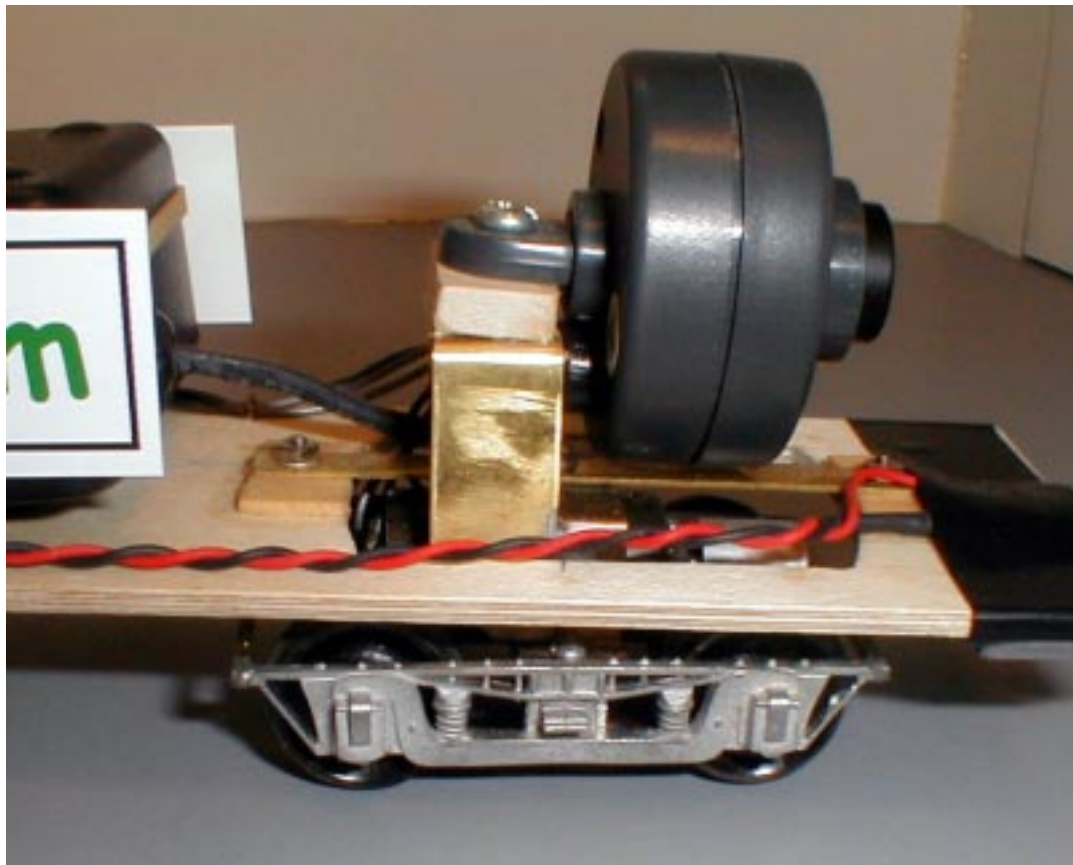


Photo 7 – This close-up view of the power truck shows how it was mounted to the floorboard and the bracket that was added to hold the camera so it swivels with the truck as it rounds a curve.



Photo 8 – This shot of the monitor at the 2001 Fall Trolley Extravaganza shows Richard Kerr's trolley-cam setup running as the last car of a freight train, behind the gondola and freight motor.

Additional photos and dimensions of the Xcam2:

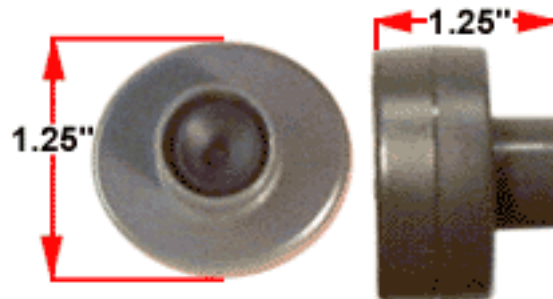


Photo 9 – Here are the dimensions for the tiny Xcam2 camera module.

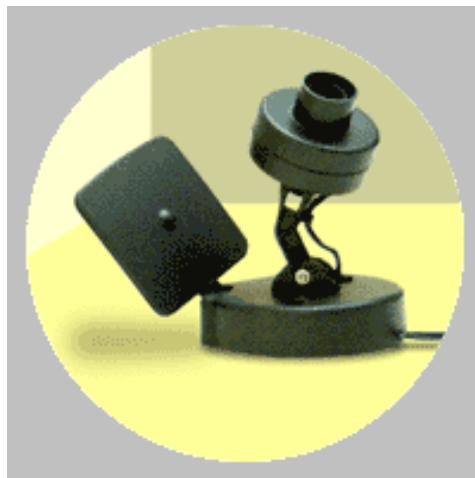


Photo 10 – The camera module comes mounted on a base unit that contains the circuit board and transmitting antenna.