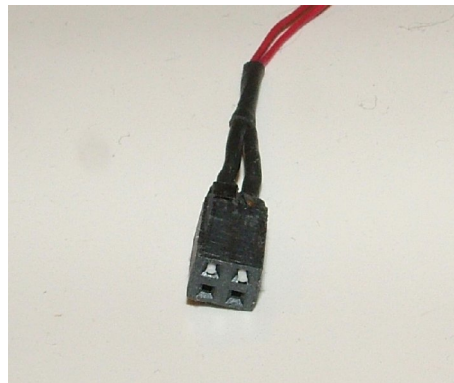


## BalloonSat Camera



The camera in your BalloonSat kit was modified for the flight computer you are building. The camera comes with a ¼-20 bolt and two washers. The camera must be bolted to the airframe of your BalloonSat. To help the Styrofoam airframe hold the bolt, there's also a small sheet of thick Polystyrene plastic. Drill a hole in the plastic and then glue it to the outside of the airframe. The plastic will spread out the stress of the bolt so it can't crush the airframe.

There's a power switch on top of the camera. The shutter button we removed and replaced with the red cable coming out of the camera. The place this modification took place is now covered with a layer of hot glue. The end of the cable terminates in a two-by-two receptacle. Two of the holes in the receptacle are plugged with small plastic dowels. The other two holes plug the cameras into the flight computer's Camera Port.



**Figure 1. The end of the camera's shutter cable.**

If you plug the shutter cable into the flight computer and turn on the camera, then the flight computer will record a picture with the following commands.

**HIGH 2**  
**PAUSE 1000**  
**LOW 2**

The HIGH command turns on the camera relay on the flight computer. When its energized, a switch inside of the relay closes. The camera is unable to tell if this switch is its original shutter button. Therefore, the relay takes the place of the shutter and triggers the camera. The PAUSE command holds the relay closed for 1000 milliseconds, or one second. The camera won't take a picture if its shutter is held down for too short of period of time. The LOW command shuts off the relay and releases the camera's shutter. By repeating the commands, the camera will continue taking pictures.

Check through the camera's menu. One setting you'll want to change is how long the camera will wait for the shutter before it turns off. There is no need for the camera to ever shut itself off, so find this setting and turn it off.

The BalloonSat kit comes with a polarizing filter and four theater gels (blue and red). The polarizing filter can be placed over the camera lens to detect the presence of polarized light in near space. When the theater gels are stacked up, they block visible light and only let near infrared light (NIR) enter the camera. According to the camera, the intensity of NIR is not as great as visible light. Therefore, the camera shutter must stay open longer. The BalloonSat will spin and swing during its mission. You can help dampen out this motion by adding two long dowels to the BalloonSat. If the dowels stick out a few feet from the BalloonSat, their inertia will make it more difficult for your BalloonSat to swing around. You might even try adding light weights to the end of the dowels. But remember, your BalloonSat can't weight more than a pound.



**Figure 2. Example of a NIR image taken by the modified BalloonSat camera. The camera was set to record black and white images.**