Building an inexpensive onboard video system

Tech Tips Series by Max Praglin, RocketChutes.com
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This last winter, as I was looking for a new rocket project, I became interested in onboard rocket videos - I found that the added complexity gives flying rockets a purpose besides just going up and down. But where's the fun in just watching other peoples' videos? High quality onboard video for rocketeers is just a couple steps away!


CVS camcorder.

My search for rocketry video systems yielded expensive video cameras, wireless video systems, and complex camera triggering devices. I'm sure these all work great - but I was looking for something cheap, simple, digital, and small enough to fit inside the 2.6" Cosmodrome Rocketry Nike Smoke I was working on at the time.

The solution: a one-time use digital video camera from the local drug store (CVS Pharmacy), which happens to fit snuggly inside a 2.6" tube. The camera allows for 20 minutes of recording and lets the user erase the last video (in the event of a misfire or any other delay). The CVS video camera costs around $30.

I wanted to design a downward-looking mirror attachment - it's pretty exciting to look at the earth fall away in a plume of smoke. Also, it's worth the extra work of making a mirror system in order to get a bird's-eye view of the launch site. The primary challenge of creating a downward view using the CVS video camera is compensating for the camera's off-center lens. Centering the mirror on the body tube would create an angled view of the rocket, so I designed the mirror attachment to be off-center like the lens, resulting in a line of view parallel to the body tube of the rocket.


The housing shows the offset necessary for the camera's lens placement.

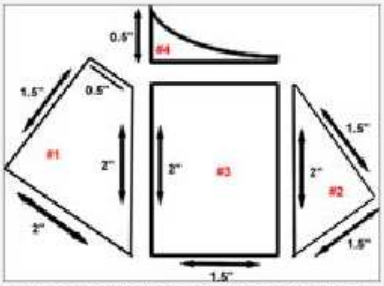

T-nuts in the nose cone retain the payload section.

I positioned the camera between the bulkhead of the payload section (not standard with the kit) and the nosecone. I used four 6-32 screws fitting into tee nuts sunk into the balsa nose cone to secure the section. As long as you can easily open up and secure the compartment, be creative with camera placement. For larger airframe diameters, it may work to put a section of 2.6" tubing against the wall of the larger tube.

The mirror housing is constructed from 1/4" basswood. I chose thick basswood for its light weight, ease of sanding edges into curves, and width for a strong attachment (and I had some scraps laying around). For the mirror, anything highly reflective should work. I happened to acquire a hard drive destined for the trash pile and cut out a small rectangle from one of the platters. Platters are surprisingly reflective!

Before constructing the housing, I cut a 1" wide by 1-1/4" tall "window" in the tube (and coupler too) and reinforced the cuts with CA in order to reduce the risk of tearing. I mocked-up the camera housing with construction paper until I came up with dimensions shown.

The housing is constructed from four pieces of wood. The mirror is made from a 1" x 1-3/4" piece of the hard drive platter which I cut with a Dremel tool. First, I glued the two side supports (parts # 1 and # 2) to the mirror support (part # 3). I next worked on beveling the edges of the side supports so they contact the body tube completely. I then glued the assembled pieces to the body.



Wood parts needs to construct the shroud. The author used basswood.


Max's Nike Smoke lifts off on another video-laden G flight.

MORE ON THIS STORY:
YouTube video taken from CVS Camera

Following this, I put in the curved piece (part # 4) to fill the gap. Sanding is required to make the curved piece fit well.

Finally, I used the Dremel to bevel the top and sides, following up the sanding by filling with epoxy. Wood glue may work, but I recommend 5-Minute Epoxy for its excellent filling and quick drying qualities. Before attaching the mirror, I painted the rocket.

As a final note, make sure the rocket you are using has a sufficiently strong shock cord - the extra weight on the other end of the cord will increase the strain when it suddenly stops after ejection. I found this out the hard way (even with a nylon shock cord).

The NAR section I fly with (SCRA) is kind enough to pause launching to let me start the camera just before flight, thereby greatly reducing the amount of costly footage of the rocket sitting on the pad. It typically takes me three or four minutes to turn on the camera, zoom in, position it in the tube, and seal-up the compartment.

On my first launch, with an F40 motor, the rocket roared off the pad, and the mirror housing seemed to have no effect on the flight. The rocket has since then flown successfully on a G71, G77, G38, and a G76.

Videos of these flights can be found at: http://www.rocketchutes.com/NikeFlights.htm