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PEAK OF FLIGHT

NEWSLETTER

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Apogee Components, Inc. — Your Source For Rocket Supplies That Will Take You To The “Peak-of-Flight”
3355 Fillmore Ridge Heights
Colorado Springs, Colorado 80907-9024 USA
www.ApogeeRockets.com e-mail: orders@apogeerockets.com
Phone: 719-535-9335 Fax: 719-534-9050

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Use High Speed Videography To Capture Images Previously Unseen (Sort of) by Human Eyes

By Mike Momenee

In my case, my interest in rocketry began with the beginning of the U.S. manned space program. My entry into model rocketry in the late 1960's started with a sense of wonderment, which eventually morphed into scientific curiosity. That curiosity led me, along with cohort Kirk Packo, to launch a Kodak 8mm movie camera several times in 1971.

I was really interested in what the ground looked like from the rocket's perspective. But I was very interested- maybe fixated- on seeing the rocket body section descending to earth under separate parachute, as seen from the movie camera section drifting down under its own parachute. I never did get that "holy grail" of a shot from the onboard movies we made in 1971 or from the reincarnation of the rocket I built and launched in 1977.

Fast forward to 2010, when I became a "born again rocketeer". I began designing and launching high power rockets with a small video camcorder in them. I hadn't forgotten about my hope of someday seeing the rocket body section drifting down under parachute from the camcorder's perspective.

But along the way of looking for that special (to me) shot, I discovered some amazing moments that truly I had never seen before, even though I had seen my videos many times. The fact is that some of the events in a rocket's flight happen in milliseconds- so quickly that your brain can't recognize what it sees for that one frame of video.

With Apogee Components selling two different camcorders (www.ApogeeRockets.com/Electronics_Payloads/Cameras), it may be the time to think about "discovering" amazing sights during the rocket's flight that few have seen before. It may be as rewarding to you as it is to me, and with some patience while viewing your video, you may come up with some stunning still shots.

The key is using one of a number of freeware video players available. I happen to use the VCL Media Player (www.videolan.org). It not only allows you to play the video at 25% normal speed (which allows you to see some portions of the flight which would go by in the blink of an eye at normal speed), but it also allows for frame by frame video advance. That frame by frame functionality allows you to search for the instant of a flight event which you may be interested in capturing. It also has a "snapshot" button which allows you to save a "vidcap" (video capture) of that particular video frame. It is all VERY easy to use, and you don't have to go through the entire video frame by frame.

So, let's start at the beginning of the launch. You may use a launch rod or a launch rail. Have you ever seen the rocket just as it leaves the guidance of the rail, from the rocket's perspective?

In Photo 2, the square end of the 1010 launch rail,

Photo 1: The BoosterVision GearCam HD records true high-definition video at 30 frames per second.

Photo 2: Rocket leaves the launch rail

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Newsletter Staff

Writer: Tim Van Milligan
Layout / Cover Artist: Tim Van Milligan
Proofreader: Michelle Mason

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with it's distinctive four slots running the length of the rail, is visible on the left just as the rocket is about to leave its guidance. The launch rail lug/button attached to the rocket is also visible a split second after it cleared the end of the rail. At this stage of the rocket's flight, it has traveled less than six feet. The launch pad is obscured by the exhaust smoke from the motor.

In the case of the rocket in Photo 3, it is a two stage rocket. The rocket will glide for about 1.5 seconds after main stage burnout, at which time the PerfectFlite MiniTimer3 staging timer (www.ApogeeRockets.com/Electronics_Payloads/Staging/PerfectFlite_MiniTimer3_Staging_Timer) ignites the second stage. Notice that the fiery exhaust looks vaguely "four leaf clover" shaped, because the booster has four slots in which the main stage nestles, and the exhaust initially shoots out though those slots.

In Photo 4 the purple-bodied booster stage falls away from the main stage. The booster's yellow and black fins are visible in the photo, just as I hoped they might be.

Photo 4: Booster stage falling away, and smoke cloud around the launch area from the booster's burn.

Note the end of the heavy smoke trail, which is where the booster motor burned out, and then the more or less smoke-free area of the flight path until the main stage motor ignited.

As the rocket reaches apogee, and gravity and drag overcome its upward motion, it begins to arc back to earth. Although this is a relatively slow event compared to other

Photo 3: Unique exhaust plume of a rocket at the instant of staging.

Photo 5: Beautiful horizon shot as the rocket arcs over.

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stages of the launch, some beautiful shots of the horizon can sometimes be seen, as in Photo 5. You may even be able to recognize landmarks.

Now, hopefully if the motor's ejection charge or the altimeter-fired ejection charge works as planned, the drogue or main chute will be ejected from the rocket body, which look similar to Photo 6.

Photo 6: Laundry day, as it is called when the parachute is strung out on the line.

Photo 7: The x-form drogue chute billowing open while a beautiful horizon is seen in the background.

Note in Photo 6 the quicklink, the silver swivel and the purple/blue furled main parachute in the foreground. But also note the yellow main chute tube, with ejection smoke still filling it.

And sometimes you may be fortunate enough to see the drogue chute actually billow open before it takes its position above the camcorder section (Photo 7).

The yellow and black X-form drogue chute looks impressive, and the fin/motor section seems to be flying at the end of the shock cord tethering it to the camcorder/main chute section. This is the perfect example of an incredible vidcap that would have been just an unnoticed frame in a flight video playing at normal speed.

As the rocket descends under parachute, you may see other views that you could never have expected:

Photo 8 shows my daughter and son-in-law looking up at the descending camcorder section as it passes over the flight line. One of my

Photo 8: Spectators looking up as the rocket passes over their heads.

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Wanted: Your Rocket Products

If you're a manufacturer of rocketry products, like kits, electronic payloads, parts, construction tools, motors, launch equipment, or something totally cool, we're interested in talking to you. We're always looking for new products to sell.

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already-flown rockets is in the bed of their truck.

Sometimes, a flight doesn't go as planned, and a lawn dart can be the result. In this case, I was flying a two-motor cluster, and one motor failed to ignite. I was using single-use motors with a ten second delay for the drogue chute, and an altimeter-fired charge for the main chute ejection. Because I have my drogue chute connected to the top of the nosecone with Kevlar shock cord, the drogue charge HAS to fire before the main chute charge in order for the main chute to be released. The rocket was nosediving back toward earth when the altimeter fired the main chute charge at 400 feet, but all didn't turn out well as can be seen in Photo 9.

Photo 9: Oops. This rocket didn't deploy correctly, and the tube is being torn apart.

The video-capture (shortened to "vidcap") in Photo 9 shows the black main-chute body tube literally being torn because it is trapped by the Kevlar drogue shock cord running from the nosecone to the fin/ motor section. The camcorder section, with a black dot in the foreground which is the rotary altimeter switch, is being pulled sideways out of the body tube. That's a quicklink, a swivel and the ends of the main parachute shroud lines being torn through the body tube.

Thankfully, the drogue also came out finally, and the rocket landed safely, but with a five inch long gash down the side of the main chute tube because of one motor not igniting. I rebuilt the rocket so that both the drogue and main ejection charges are fired by the altimeter. But actually being able to see the mid-air malfunction in a few frames of the video was frankly more exciting that if the flight had gone off with out a hitch.

And finally- yes, I have found numerous vidcaps of the fin/motor section coming down under parachute, as seen from the descending camcorder section. In Photo 10, here's one where you can see the entire parachute and rocket configuration, albeit from a bit of a distance. You're

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Photo 10: Fin can descending below the camcorder.

seeing, from right to left: a black parachute with fluorescent shroud lines, a white dot which is actually the piston ejection system, the yellow main chute body tube section, and the yellow fin/ motor tube section. The flat, brown/gray cattle ranch land beneath it almost makes it look like the rocket is flying over a lunar landscape:

There still are things to be discovered in amateur rocketry, and in my case, I'm looking frame by frame for those split-second events that can't be seen from the ground, and many times go unrecognized when the inflight videos are played at normal speed. I hope that this article may inspire you to illuminate some of those hidden gems within our great hobby.

When you do, please share the vidcaps!

By the way, my 28 inflight videos, with selected vidcaps at the beginning of each video, can be found at Youtube by searching for jmomenee.

About the Author

Mike Momenee began flying model rockets during the late 1960's. He says he was a science fair and research paper nut. His paper, *"Determining the Efficiency of Ducted Propulsion Systems in Model Rocketry"*, won one of ten national scholarships in a 1971 national contest, complete with a trip to Washington, DC and a group picture on the Capitol steps. Mike graduated from Notre Dame in 1975 with a science degree, and had a successful healthcare-related sales/sales management career, from which he retired in 2008. Mike and his wife Jackie, live in sunny Valrico (Tampa) Florida, and fly at the monthly TTRA launches in Plant City.