An Insight into Aerial Photography

I don't claim to be an expert, but I can comfortably say that I'm very experienced in the art of aerial photography, shooting both stills and video.


GoPro Hero 3 Black, stock lens, WingItMount, under strut mount

The purpose of this article is to pass along some insight and lessons learned over the last 20 years or more.

Background: My first aerial shots were captured with handheld cameras from helicopters, but I really got serious about aerial photography while developing camera payloads for Radio Controlled (RC) aircraft. In the 2003 to 2007 timeframe these RC aircraft morphed into semi-autonomous Unmanned Aerial Vehicles (UAVs) fixed wing and helicopter platforms primarily designed for use by Public Safety agencies. In 2015 I began flight training and brought some of this tech along with me to study my approaches, my landings, help improve consistency, and I achieved my Private Pilots License (PPL) in 2016. In 2016 we also purchased our Cessna 172-M and my aerial photography is now accomplished flying the Cessna.

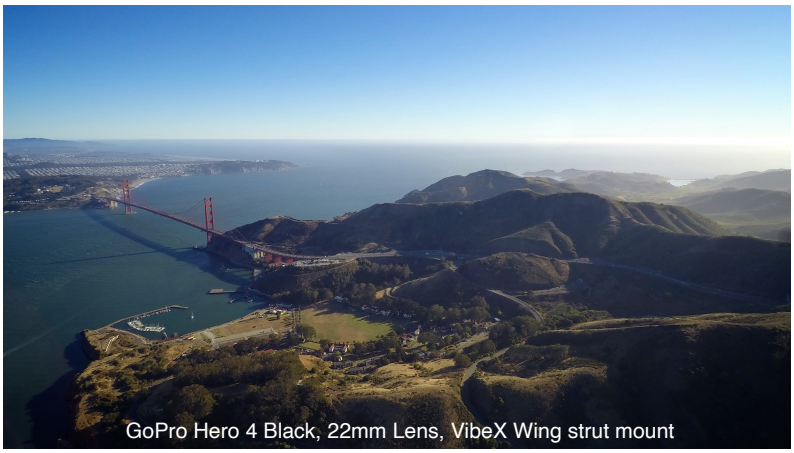
Getting started: In this article I will describe the equipment I'm using but I will not be covering all the various cameras on the market. There is a wealth of information on the Internet or from the AOPA describing the various sport cameras, their strengths, their weaknesses and FAA compliance. My advice for someone new to this is to, "start simple" and work it backwards. What I mean by "working it backwards" is to first understand your goals and your budget before investing too much time and money. Be aware that if your intention is shooting photos for private or non-compensation use, your PPL is fine but if your intent is shooting aerial photography for profit, you will need a Commercial Pilots License.

Along with aerial photography comes an added layer of workload, potential frustration, and potential fun with hours spent sorting through photos or post processing video.

GoPro Hero 4 Black, Peau Production Lens w/VibeX mount

Equipment: My goal is to shoot video and photos for personal use and share the fun of flying with family and friends. With my work in RC and UAVs I was using a variety of small "board cameras" recording video on micro-DVR equipment and transmitting/recording video to a base station. When the first GoPro came on the market it was the camera I had been waiting for. I stuck with the GoPro as it evolved to the second, third, and forth versions. The cameras are great for their target "sport" market but for aerial

work the automatic exposure and super wide angle lens with fisheye distortion can be problematic.


GoPro Hero 4 Black, 22mm Lens, VibeX Wing strut mount

The older GoPro doesn't allow access to ISO or shutter speed settings so something I learned along time ago was that a Neutral Density (ND) filter will "trick" the camera into using a long shutter. Soon ND filters became readily available and for full size aircraft use, you see them marketed now as "prop filters" to blur the prop in video or still images.

The super wide angle lens continued to be a nagging problem. As a result software developers created tools to un-warp the image or video in post production. These tools are very effective but I was always taught that "if you want to shoot a great photo, get it right the first time".

Recognizing a market to address this issue a company in San Diego called "Peau Productions" started developing and marketing different lenses for the GoPro and other sport cameras. The first lenses were a "do-it-yourself" kind of thing and over time, Peau Productions started selling modified GoPro cameras with their lenses pre-installed, focused, and ready for use. Today I'm flying with a Peau Productions 22mm f2.4 lens GoPro Hero4 Black, and often use a GoPro Hero3 Black with stock lens. With both cameras I'm using the GoPro "piggyback" battery option to extended battery life.

My preferred camera mounting locations are the Cessna wing struts or wing tie-down rings. Camera tie-down ring mounts being used are from FlightFlix and I often use a machined mount from WingItMounts. For shooting video, FlightFlix sells the Rock Steady Vibe-X isolation mount to help reduce vibration and I've found this to work well.

For interior shots I have a GoPro mounting clip on my ceiling console and either direct mount the camera or often fly with a camera mounted to an EVO SS 3-axis stabilized gimbal. By using the stabilized gimbal the camera will move independently from the aircraft to deliver some amazing video or still images.

Post-processing is done using a MAC, with 12TB of storage and growing. Video editing is accomplished with Apple's Final Cut Pro and for still images, Apple's Aperture photo processing software.

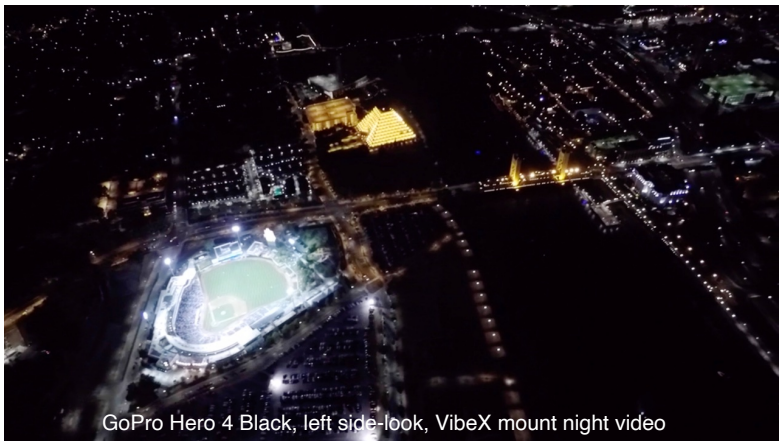

GoPro Hero 3 Black, ND filter, EVO 3-Axis Stabilized Gimbal

Stills vs Video: In the beginning I always shot video and when I wanted a still image, I would do a screen capture or export a single frame from my video editing software. Video files are very large, and unless you're sharing video on YouTube or another social media site, they are time consuming and hard to share. I also found that unless something spectacular was captured in video, most people enjoyed still images much more. Today, unless I need a video clip for a specific reason I'm always shooting still images.

Shooting video or stills should never create a distraction from flying. As the old saying goes, "out of sight, out of mind" and most often, my cameras are mounted outside the cabin set to continuously shoot a photo once every two seconds. During my final "walk around" before take-off I start the cameras and forget about them. I

do not have wireless camera controls or camera video displays in the cockpit. I will admit to mentally "framing a shot" as I fly and in someways I think this has helped improve my flying especially when I'm shooting video.

Camera angles: Experiment with different camera angles and you might surprise yourself with the results. My most common mounting position is from the wing tie-down ring on either wing looking forward, looking at an angle to the rear, or looking straight out the wing. For special projects I sometimes have the camera looking straight down, or when I want to checkup on my landings, looking at the main landing gear. Inside the cabin my cameras are typically mounted from the center console in the ceiling looking forward, or I've used suction cup mounts **inside** my pilot door window looking across the panel and out the front/passenger side.


GoPro Hero 4 Black, left side-look, VibeX mount night video

Frustration and disappointment: Nothing is more disappointing than returning from a 2 hour flight with ideal lighting knowing you must have captured some amazing photos only to find out the camera stopped recording video or shooting photos 10 minutes after takeoff. Just as bad, you forgot to start the camera or after landing find out a bug splattered the camera lens, hoping it didn't happen before capturing those incredible photos. But it happens. The GoPro cameras will often overheat and shutdown, the piggyback battery doesn't always work, the memory cards can be touchy causing the cameras to stop, battery life can often be unpredictable, and there's a long list of possible reasons why. The good news is that 95% of the time these cameras are very reliable and deliver amazing results.

Summary: Before spending a lot of money I suggest thinking through your goals, your budget, and start simple to see if this is something you enjoy. Consider mounting a camera inside the aircraft first to get a feel for the amount of "computer time" you'll experience reviewing and processing video/photos. Experiment with different camera angles and if this proves to be something you really enjoy, make the investment in a high quality exterior mount and start shooting photos/videos outside the plane.

The most critical thing is to never let the cameras create a distraction from your flying. After pre-flight and during that last "walk-around", start the cameras and forget about them until landing. Most importantly, have fun.

Enjoy your flying, Mark

Products and resources mentioned:

FlightFlix: https://flightflix.net/

WingItMount: https://www.aircraftspruce.com/catalog/avpages/wingitmount.php

Peau Productions: https://peauproductions.com

EVO SS Gimbal: https://evogimbals.com

AOPA Camera Course: https://www.aopa.org/news-and-media/all-news/2021/october/pilot/cam-course

FlightFlix FAA Information guide: https://flightflix.net/faa-camera-mount-guide/