

Aerial Photography made Easy

**from
getting Started,
to
getting GOOD!**



By Henry G. Fiorentini

Aerial Photography made Easy



NOTES:

- “Where to buy”
is a slide at the end.
- The QR Code includes
all these Slides
- and a link to my website
with more pictures &
videos
- INCLUDING:
“Look around you!”
360 videos!



The 3 elements of Aerial Photography are:



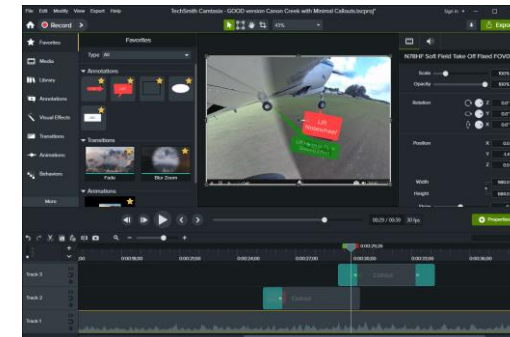
- The **Camera**



- The **Mount**



- The **Software**



Presentation Overview



We will first review the options for each of these 3 major components

- like taking inventory of tools in your Toolbox

Then, we'll combine this knowledge to show how to make videos both IN and OUTside the Cockpit.

Sneak Peek on Costs: The **Camera**



A sample price guide is:

- **“Go Pro HERO”** or equiv \$ 330
- Good ‘no name’ **Action Cam** \$ 80
- **“Go Pro 360”** (OUT side only!) \$ 250
- **Your Phone** (IN side only!) \$ 0

And remember to add Audio:

- **Digital Voice Recorder+Cable** \$ 31

Sneak Peek on Costs: The **Mount**

A sample price guide is:



Inside (choice of)

- Ceiling (*std 'GoPro clip'*)
- (for **phone**)
- **Headrest**

\$ 0

\$ 20

\$ 20 - \$69

Outside (choice of)

- Basic **GoPro Mount**
- “C.A.P. **Bayonet** ”
- “MGF **Maui Pole**”

\$ 0

\$ 128

\$ 209

Sneak Peek on Costs: The **Software**

A sample price guide is:



- | | | |
|---------------------------|--------------|----------|
| • VLC Editor | | (FREE) |
| • Camtasia | | \$180/yr |
| • Power Director | 1x Purchase | \$140 |
| | Subscription | \$80/yr |
| • Da Vinci Resolve | | (FREE) |

Focus on **CAMERAS**



First, some common Terminology

- **FOV** is “**Field of View**” which is pretty much what it sounds like but if I’m using “FOV” in future slides, I need define it first. So I am.
- **Aspect Ratio** is simply the ratio of “How Wide” : “How Tall”
The industry standard is 16:9 which basically 2:1 (wide x tall)

Focus on **CAMERAS**



Terminology 2:

- **EIS** is “**Electronic Image Stabilization**”, the software built into the camera that removes the inherent shakiness and jitter of videos taken from your surfboard, mountain bike, or wingtip.
- It does this by ‘zooming in a bit’ for your final video, but moving the viewing frame around to compensate for the jitter during the video. You may need to enable it in your Settings/Camera menu.
- This can also be implemented via Software after the fact (“Post Production), but ‘from the start, in the camera’ is best.

Focus on **CAMERAS**



Terminology 3:

Horizon Lock is pretty much what the name implies:

- Like EIS, the camera will output a narrower FOV than it is recording, but automatically 'rotate' the final FOV that you see, to keep the horizon straight.
- This has the effect of having the camera on a gimbal that remains level to the horizon, instead of rigidly bolted to the plane. Sometimes this is desirable, sometimes it isn't.
- This is usually a user-defined option that you can turn on or off as you see fit

Focus on **CAMERAS**



Terminology 4:

- **AE/AF Lock is Auto Exposure / Auto Focus Lock.**

This is important in the cockpit if you want the camera to set its exposure (iris setting) and focus on the panel gauges instead of the big (bright) view out the front window which it will normally do.

- This can be essential for INside recording, lest your panel be underexposed/black in reference to the more dominant outside view.
- (iPhone) cameras achieve this by a simple ‘tap and hold’ on that portion of the screen. It is not available on other cameras.

Focus on **CAMERAS**

Terminology 5:



- **Resolution**
- All digital cameras are basically a mosaic tile of individual, itty-bitty picture elements (called 'pixels').
- For example, about the lowest resolution around these days is 1920 pixels across, by **1080** pixels high.
- Multiplying 1920×1080 you get 2,073,600 – or '**2 Million**' in round numbers.
- So a resolution of 1920×1080 is sometimes referred to by its horizontal resolution (**1080**), or by its total pixel count (**2 Mega Pixels**), or the marketing name of **FHD**: Full High Definition

Focus on **CAMERAS**



- “Go Pro” is the “Go To” name brand expectation for all things for outdoor photography – and even ‘action shots’ inside (like a cockpit).
- But the ~\$250-\$350+ Go Pro cameras ***are far from your only choice.***
- Here’s a quick summary of the 4 cameras we’ll be looking at for in- and out- side the cockpit.

Focus on CAMERAS



Akaso		\$ 60				
	If you do not need absolute, top-of-the-line quality, this is an amazingly good camera at an amazing price. And a few years ago, this camera's specs <i>were</i> the 'then top-of-the-line'. In some respects, this camera's simplicity make it BETTER than a Go Pro, like the small size and separate Shutter key fob					
	Blue Tooth/Remote	YES	WiFi Preview	YES		
	Res Video		8 MP (4 k)	4MP (2.7k)		
	Use the AKASO app to control					
					EIS	YES
					AE/AF Lock:	NO

Focus on CAMERAS



Go Pro Hero		\$330				
		The “Hero” Line is what Go Pro calls the action cameras that we are looking at. From a recent Amazon purchase, \$400 buys you the camera, a battery, the SD memory card, the basic “Buckle + FingerClip” mounts, and even a cable and case. This is the most expensive of the cameras, offering very high resolution and ‘hi speed’ capture to slo-mo your mogul jumps.				
	Blue Tooth/Remote	YES	WiFi Preview	YES	EIS	YES
	Res Video	16MP (5.3k)	8 MP (4 k)	2MP (1920x1080)	AE/AF Lock:	NO
Uses the QUIK app to control/preview/select a wide variety of recording options						

Focus on CAMERAS



Go Pro Max 360		\$250			
The main (only?) reason to buy this is for the OUTside, full 360-degree ‘wow!’ experience, as its 2D mode isn’t impressive. But if you <u>are</u> looking for a ‘WOW!’ video experience, you need a 360 camera. Other companies make competitive 360 camera alternatives too, but I own the Go Pro so that’s what we’re demonstrating.					
Blue Tooth/Remote		YES	WiFi Preview	YES	EIS YES
Res Video			8 MP (4 k)	2MP (1920x1080)	AE/AF Lock: NO
Uses the QUIK app to control/preview/select a wide variety of recording options					

Focus on **CAMERAS**

iPhone (or equiv)		\$1,000 + / 'free'			
The specs for most smartphones exceed the quality of many dedicated cameras of even a few years ago, making them a hands-down choice for cockpit recording if you have any desire to actually see what's on your panel. And even if just a quick 'watch my flight!' video, it is a great choice that you already own. Perhaps most notable is that you can: • Select the <u>OPTICAL</u> zoom with 3-4 explicit lenses, not 1 lens with digital zoom, AND • Set the Exposure/Focus specifically for the Panel, not the windshield. And since everyone already owns one, the incremental cost is 'FREE'. The only 'pain' is that it stores in .MOV format, not .MP4 SPOILER ALERT: This is my hands-down choice for cockpit reporting – NOT a Go Pro					
Blue Tooth/Remote	NO	WiFi Preview	NO	EIS	YES
Res Video		8 MP (4 k)	2MP (1920x1080)	AE/AF Lock:	YES
There is no remote or preview functionality, but the clarity makes it a superior choice for cockpit recording					



Focus on **CAMERAS**

QR Code/website shows all 3 camera videos, simultaneously mounted on an underwing bayonet mount

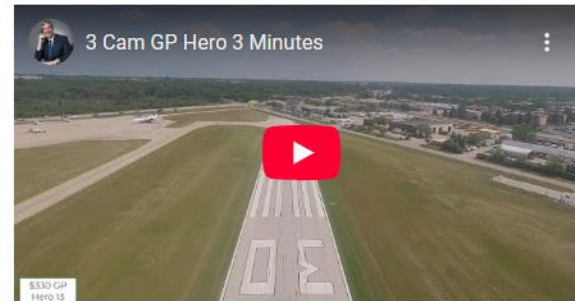


\$80 Akaso

The Least expensive Action Camera

\$350 Go Pro HERO

"Top of the Line" Go Pro Hero camera



\$250 Go Pro Max "360" Camera

Requires a PC or VR headset. Phones often don't have software to watch properly.

Remember to 'Drag and Pan' with mouse to turn around!

Scroll wheel to zoom in.



Color Balance and Clarity vary, as does Stability, but they are all good shots.

Focus on **CAMERAS**



Summary: **Features**

Camera	Price	Max Res	BT/ Wi-Fi	EIS	AE/F Lock
Akaso	\$60	8 Mp	✓	✓	✗
Go Pro Hero	\$ 330	16 Mp	✓	✓	✗
Go Pro Max 360	\$250	8 Mp	✓	✓	✗
iPhone	(Free)	8 Mp	✗	✓	✓

Focus on **CAMERAS**



Summary: **Resolution**

Resolution	5.3K	4k	2.7k	1440	1080
(“Name”)		UHD			FHD
	5312 x 2988	3840 x 2160	2688 x 1512	1440 x 810	1920 x 1080
Megapixels	16MP	8Mp	4Mp		2Mp
GP HERO	✓	✓			✓
AKASO EK7000		✓	✓		
iPhone 13		✓			✓
GP Max 360					
Hero 2D mode				✓	✓
360 mode	✓		✓		

Focus on **CAMERAS**



HD (High Definition) refers to a display resolution of **1280 x 720** pixels,
FHD (Full High Definition) refers to a display resolution of **1920 x 1080** pixels
UHD (Ultra High Definition) refers to a display resolution of **3840 x 2160** pixels.
also called 4K, and it is 4x the resolution of Full HD (1920 x 1080).

“**MP4**” is the universal standard for videos, much like “**JPG**” is the universal standard for still pictures.

“**MOV**” is a higher-density format created by Apple, but only useful for advanced videographers and you’ll invariably convert to MP4 at your earliest convenience.

Focus on **CAMERAS**



Doing the Math for “File Size”

CAMERA	MB/Min at high Resolution	MB/Min at lower Resolution
AKASO	330 Mb/Min @ 3840 x 2160	61 Mb/Min @ 1920 x 1080
GP Hero 13	291 Mb/Min @ 3840 x 2160	
GP Max 360	251 Mb/Min @ 4096 x 2048	
iPhone	289 Mb/Min @ 4096 x 2160	

So, a “10 Minute Video” at High Resolution (4k) will consume about 2.89 GB,

Call it **3 GB for 10 minutes**

Focus on **CAMERAS**

Call it **3 GB for 10 minutes**

128 Gb and even 256 Gb cards are cheap (\$20)

Memory Card with Adapter



32GB 12 options from \$8.85	64GB \$11.99 \$13.99
128GB \$16.99 \$21.49 FREE Delivery Overnight 4 AM - 8 AM	256GB \$24.99 \$34.99 FREE Delivery Friday

But you can bloat and overflow your Hard drive within a year ***easily*** ...

- 2025-05-06 TN mtn Flight (8A3)
- 2025-05-23 PWK to KSUE Clear Clouds
- 2025-07-04 DC Weekend
- 2025-08-02 KSUE Stur Bay Canal Sightseei..
- 2025-08-15 3Camera Test

If you don't start – and keep – your videos organized, and toss out the '*never gonna look at again*' files.



Focus on **CAMERAS** (well, for Cockpit)



Audio for recording ATC

After many, many (frustrating) hours of research, the answer to the question:

“How do you record ATC Audio on your Go Pro/Action camera (or Phone)?”

is : **You can't.**

Focus on **CAMERAS** (well, for Cockpit)



Audio for recording ATC

In the 'old days' (aka 'a few years ago'), many cameras had a physical Microphone jack and you could buy a \$6 cable to convert from the 6.35mm headphone jack to the 3.5mm 'mic' size.

But everything now is via Bluetooth, and that's a problem because there's not the 'just plug it in' option.

My solution is to simply get a dedicated digital voice recorder, plugged into the rear headset jacks, and then add it to the final video in the post-production software editing. I got this one on Amazon for \$25 and added a \$6 cable (6.35mm to 3.5mm).



64GB Digital Voice Recorder with Playback:
Voice Activated Recorders for Lectures
Meetings Interviews - EVISTR Dictaphone
Recording Device Tape Recorder Portable Mini
Audio Recorder with USB, MP3

Visit the EVISTR Store

4.7 ★★★★★ (170,470) | Search this page

Amazon's Choice

\$25⁹⁹

6.35mm to 3.5mm Audio Cable, Braided 1/4" TRS Male to 1/8" Male Adapter Cord, 6.6FT Bidirectional Stereo Aux for iPhone Electric Guitar Headphone Speaker Piano Amplifier Home Theater Mixing Console

Visit the ALIEM Store

4.4 ★★★★★ (1,114) | Search this page

400+ bought in past month

-25% \$5⁹⁹

\$5.99



Focus on **MOUNTS**

Most all Action Cameras have either or both of:

- Two Finger Clip
- 1/4" Tripod thread



With the ‘Two finger Clip’ being the most common

Focus on **MOUNTS** - **IN** side the cockpit



Amazon and just about everyone else offers an almost unlimited number of mounting options

Here's just a sample of your many options to mount any camera **IN** side the cockpit:



Focus on **MOUNTS** - **IN** side the cockpit



Consider using “Removeable 3M strips” instead of the ‘almost-permanent’ Go Pro glue pads



Focus on **MOUNTS** - **IN** side the cockpit



Speaking of “Cockpit Mounts”

Use a Wire Cutter to snip off the full corner ‘elbows’ of the clip



The remaining, rounded ‘shoulders’ keep it in position, but remove the difficult “LOCK” finger pressure to remove

Focus on **MOUNTS** - **IN** side the cockpit



Warning about Cases:

I always like to keep my cameras in a protective case, so that if I bump/bang it, at worst I break off the replaceable case fingers, not that of the camera itself

But the Go Pro will overheat sitting in a warm cabin, so I got an 'outer/shell' case for using my Go Pro in the Cockpit

Focus on **MOUNTS** -**OUT** side the cockpit



The first question is :

Is it **legal /FAA-approved** to go sticking cameras on the outside of your plane?

An excellent and thorough analysis of FAA regs was done by the folks at MyGoFlight, explained at:

<https://flightflix.aero/pages/faa-guide-to-camera-mounts>

And the summary answer (IMO) is:

Focus on **MOUNTS** -**OUT** side the cockpit



“It Depends”:

If something goes wrong, or anyone complains:
You should have been more responsible.

But if nothing goes wrong, and no one complains:
The FAA has no objection 😊

Focus on **MOUNTS** -**OUT** side the cockpit



Next Question: What View/Position do you want for your camera?

Top of the Wing (Buckle Mount via glue pad)

PROs

Simple, cheap, decent outside view



CONs

You can only see pretty-much 'up' as the wing is too curved too far forward, and only to one side as the cabin blocks half your view

Focus on **MOUNTS** -**OUT** side the cockpit

Under the Wing / Fuselage :

PROs

Simple, cheap, easy, Better outside view. Looking 'forward and down' is better than 'just up'

CONs

Wi-Fi signal does not penetrate metal, rubber bladders and fuel, so need to start/stop recording from **OUTside the cockpit**, even with 'remote' control – before takeoff/ after landing, and no – inflight control



Focus on **MOUNTS** -**OUT** side the cockpit



Under wing Pole/Bayonet Mount:

PROs

Best Field of View. Clear 'line of site' for Wi-Fi control for continuous camera control IN FLIGHT

CONs

More expensive (\$130-\$230).

Slightly more involved to install & remove

MGF Pole mount (\$230)



CAP Bayonet m mount (\$128)



Focus on **MOUNTS** - "2-Finger Slippage"

"Smooth Plastic" on "Smooth Plastic" is going to slip, notably on an outside mount.



Do **NOT** use a 'Torque wrench' often included with many thumb screws !!!



Increase the FRICTION!
(Works great – trust me!)



Focus on **Software**



For VIEWING your final video:

You'll either

- upload it to **YouTube**
(which does both flat and 360),
- or the desktop **VLC** or **Media Player**.

So let's focus on Software to CREATE ('Edit') the original Video.

Focus on **Software**



There are two categories of editing Software:

“**Linear**” editors that only offer in-line cut-out or splice of your video stream

“**Non-Linear**”/ “**Multi-Track**” editors that offer a full range of audio overlays, video callout boxes and many other effects

Focus on **Software** - *NOT '360' necessarily*



Summary of Editor Choices ...

	Edit	MOV	MP4	\$\$\$	Notes
2D Video Editors					
Media Player	NO	✓	✓	FREE	
VLC	✓	✓	✓	FREE	[LINEAR] Only editing is crude excerpts to omit 'bloat'
Camtasia	✓	NO	✓	\$180/yr	[NON-Linear] Good for Delete/Cut and Call Outs
Power Director	✓	✓	✓	\$79/Yr	[NON-Linear] Delete/Cut, Pan/Zoom Nicely, and SHARPEN
Da Vinci Resolve	✓	✓	✓	FREE	[NON-Linear] Does 'everything' but <i>too complicated for me</i>

Focus on **Software** - *for '360'*



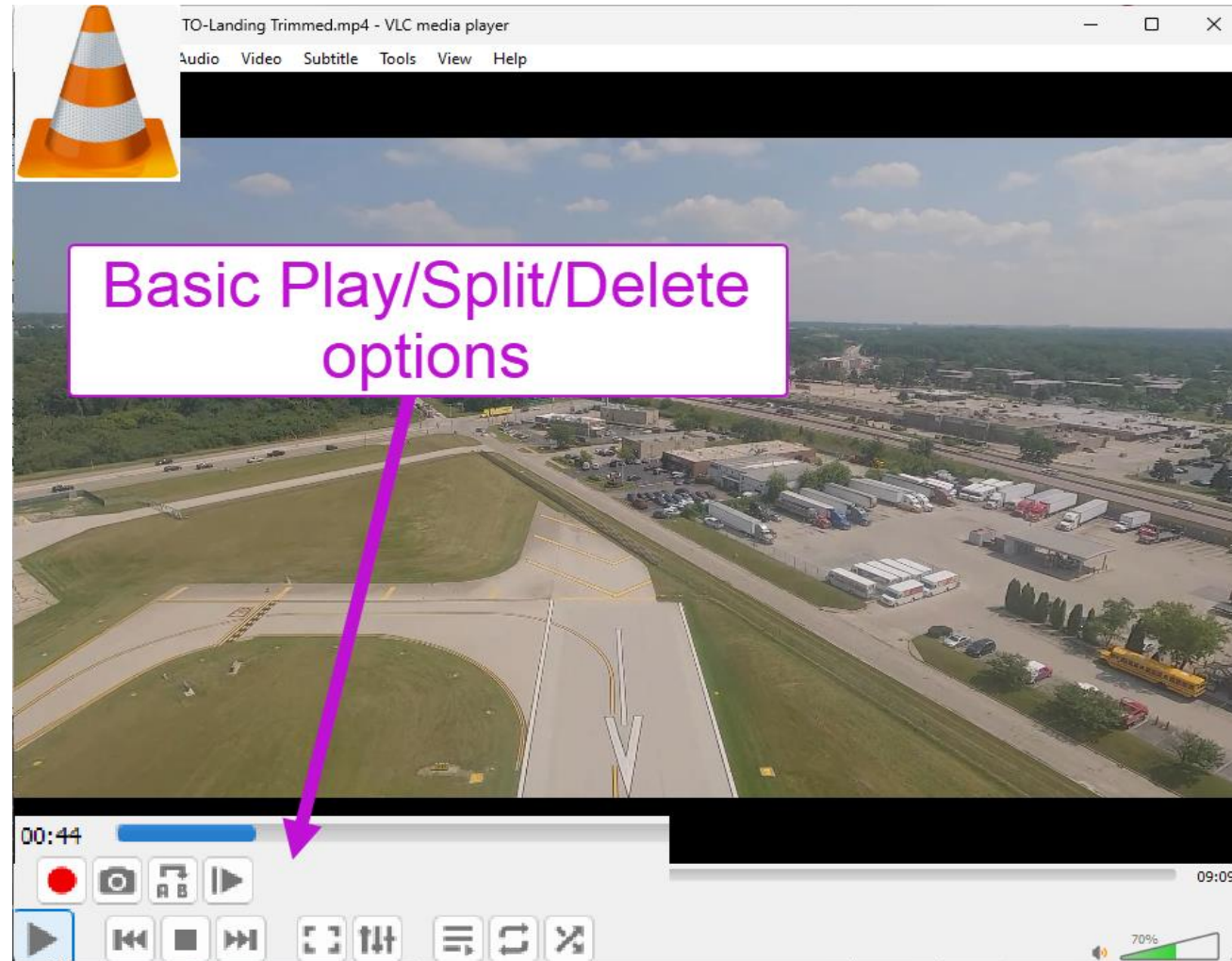
'360' videos are growing in popularity but require a slightly different breed of processing.

I like them a lot for outside video, but they are definitely not as simple and obvious to use as conventional 'flat' videos.

	Edit	View
Media Player	NO	NO
VLC	NO	✓
Camtasia	NO	NO
Power Director	✓	✓
You Tube	NO	✓

Focus on **Software**

Sample “Linear” : **VLC** for Edit/Trim

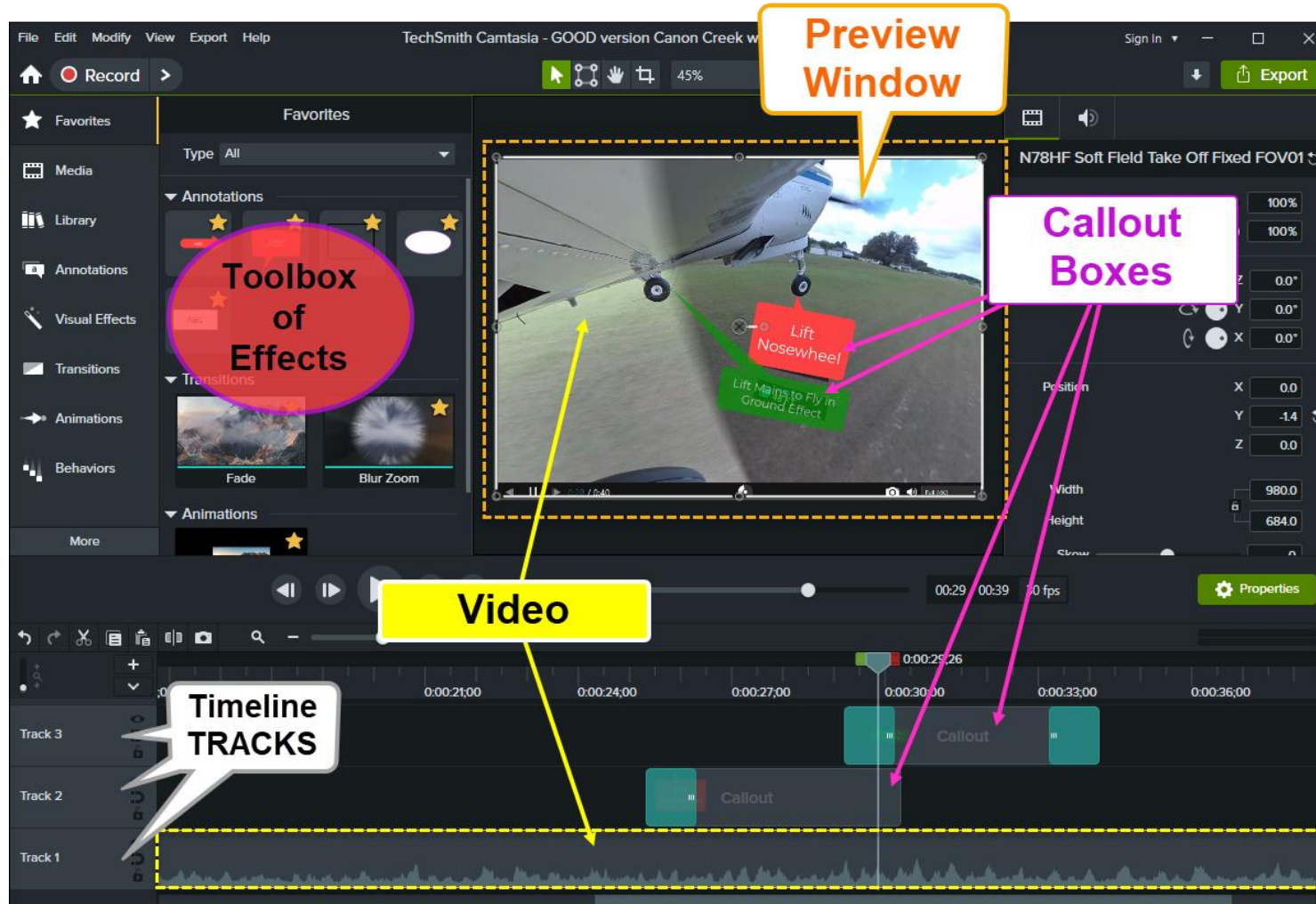


Focus on **Software**



Sample “Non-Linear” / Multi-Track editor” (CAMTASIA

/Power Director)



Focus on **Software**

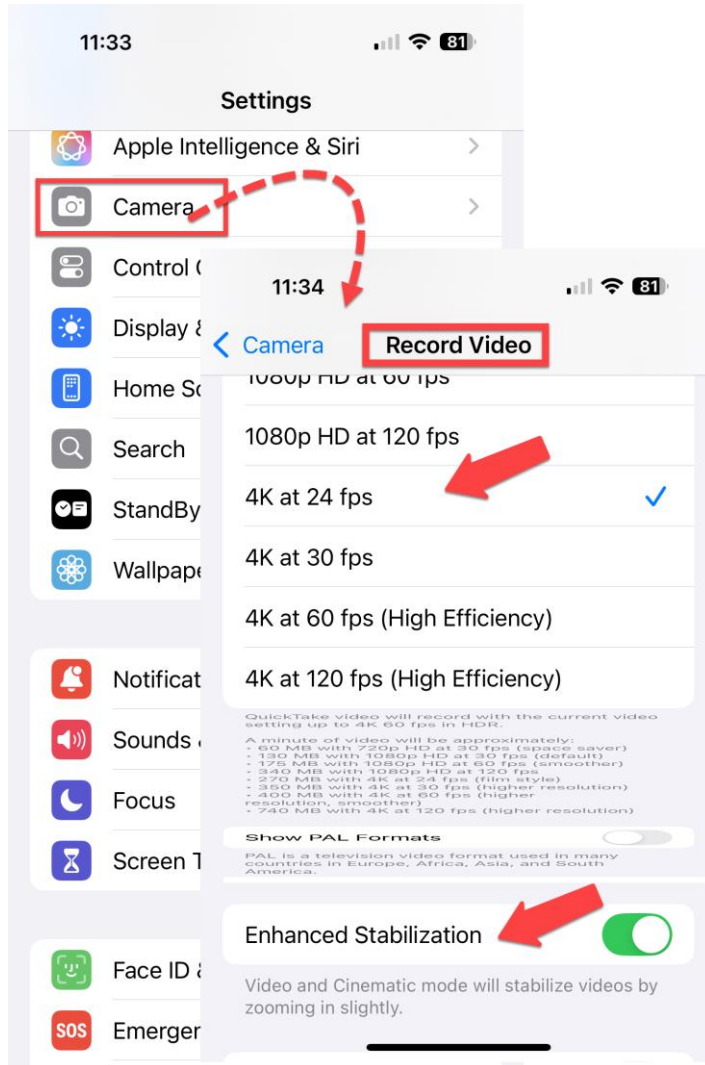


Like a LOT of software out there: It don't work quite accurately,
or even consistently

It's NOT you! 😊

Focus on Software

Some “Software Settings” happened directly at that Camera:

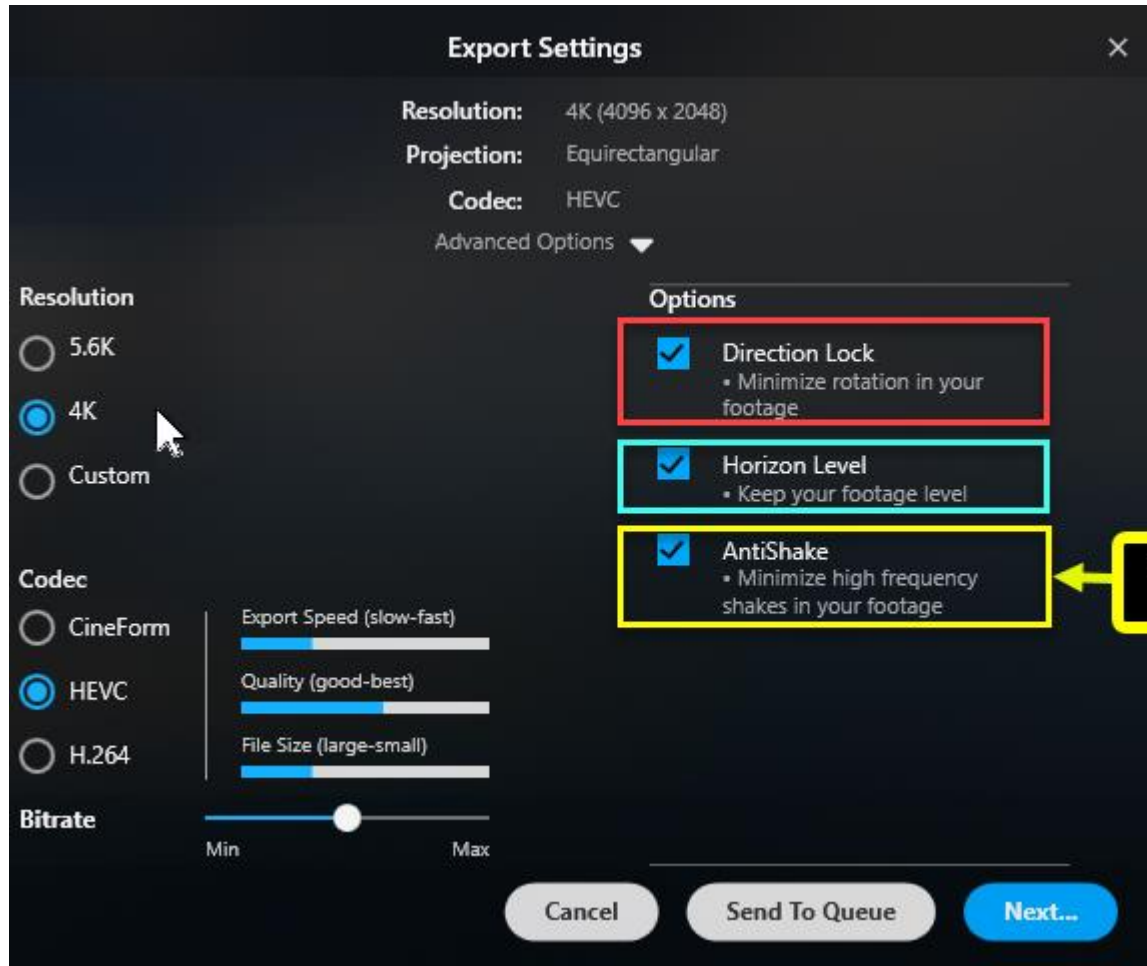


For **iPhones**, here is where you set the Resolution and engage the EIS (Stabilization)

Focus on **Software**



The Garmin 360 Camera has its own Editor for exporting to **‘Equirectangular’** MP4 format, with common, critical options.

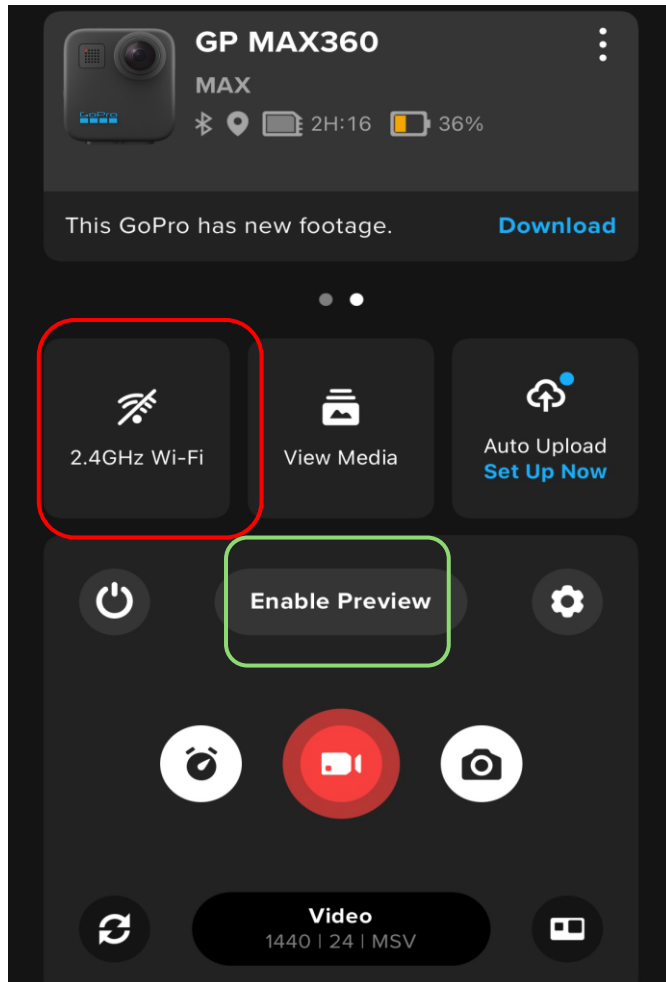


"EIS"

For Garmin 360 video clips, this is your first step, to get files into industry standard MP4 Format

Focus on Software

The Garmin cameras all share the same “App Controller” which is very good, and makes controlling your camera very easy.



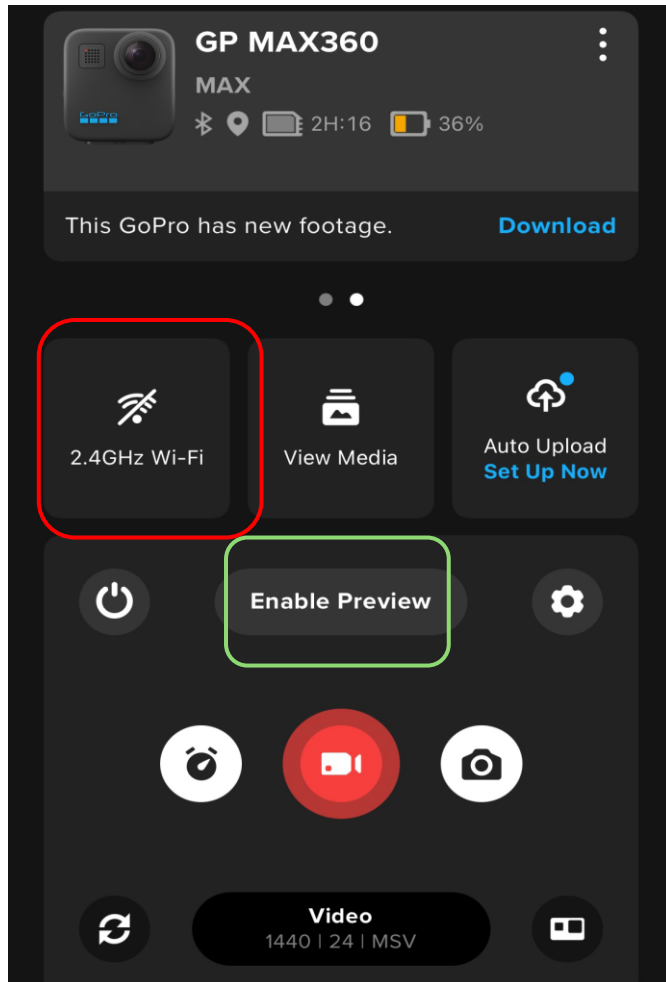
Especially if you are running 2+ cameras

Remember to select the “2.4 GHz” option for controlling the camera in flight, as it penetrates wings better than 5 GHz.

And you can get Live Preview in flight (consumes extra battery power, but...)

Focus on Software

The Garmin cameras all share the same “App Controller” which is very good, and makes controlling your camera very easy.



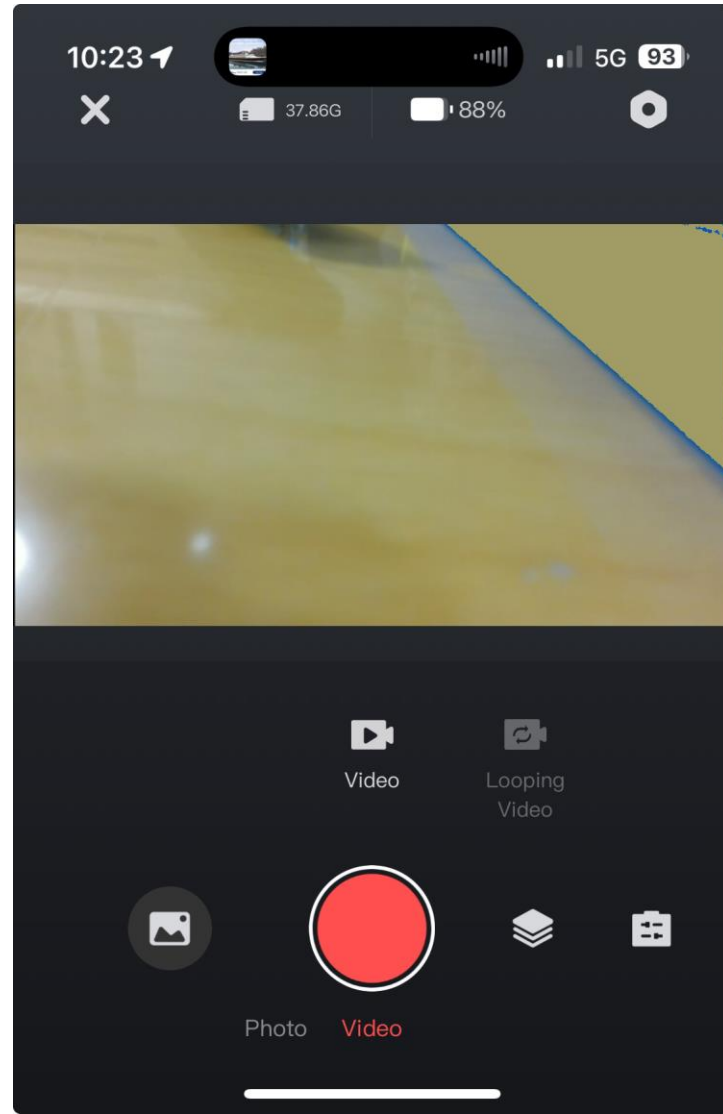
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Focus on **Software**

By Comparison, the AKASO app is much more limited.



And since they operate on their own Wi-Fi network and your iPad/iPhone can only connect to one Wi-Fi at a time, you'd need 2 devices (iPad + iPhone) if you wanted to control both camera brands during the same flight.

Putting it all together: Final Videos!

INSIDE the cockpit



\$20 for the above mount, attached to the basic buckle mount, glued to your overhead cabin grill, and you are set!

Final Videos : IN side the Cockpit



With incredible
'post production'
clarity options, and
"Picture In Picture".

PowerPoint
compresses the
display quality,
but the digits on
airspeed are
very, very legible
on the raw video!



Final Videos : IN side the Cockpit



With a modest/fair amount of ‘post production’ editing, a good camera phone, and the right mount, you can get amazing clarity of your cockpit gauges – which is most useful for training purposes.

The following ‘Picture in Picture” was taken from such a video using an iPhone 13 Pro Max, a CAP headrest camera mount for optimal positioning, and Power Director Post Production software:



Final Videos : IN side the Cockpit



For a training video I'm doing for LOP/ROP, see how clear a CAP 'headrest mount' is able to capture my center-located JPI:



Yes,

this is just
from my
iPhone video...

Final Videos : IN side the Cockpit



Video Bias:
In creating my videos, I have been focused on showing the gauges with clarity, much more so than 'out the cockpit' view.

Consequently, you COULD get a MUCH better 'passenger view' simply by

- Changing to 2x and setting FOV for window, not gauges
- Setting AE/AF for windshield not gauges.

Final Videos : IN side the Cockpit



And you COULD
select Wide
Angle (0.5x) for a
'panoramic' view

Not shown
– *I was on
Short Final!*

Final Videos : IN side the Cockpit

A Word about “Prop Chop”



“Prop Chop” is the stroboscopic effect of shutter speed and your prop.

You can add a **“Neutral Density”** filter to most cameras to lower the shutter speed and blur/soften the Prop Chop



Final Videos : IN side the Cockpit

In any event, compare using your existing (iPhone) camera in the cockpit, instead of a Go Pro



Your existing Phone is as good – or BETTER – than a Go Pro in the cockpit looking out the window, and infinitely better if you ever want to zoom in on the panel



Final Videos : IN side the Cockpit

Wide angle view (on the ground)



And if you want more of a 'passenger panorama', change the FOV to be higher (out the window) instead of so much cockpit!

Final Videos “Post Production” editing



Even ‘out of the box’, even lower-res 360 videos are pretty Good!

But “De-Noise” and “Color Correction” can really make it **‘pop’!**

Original, un enhanced



w/ DeNoise and AutoLight



Final Videos OUTSIDE – FLAT (not 360)



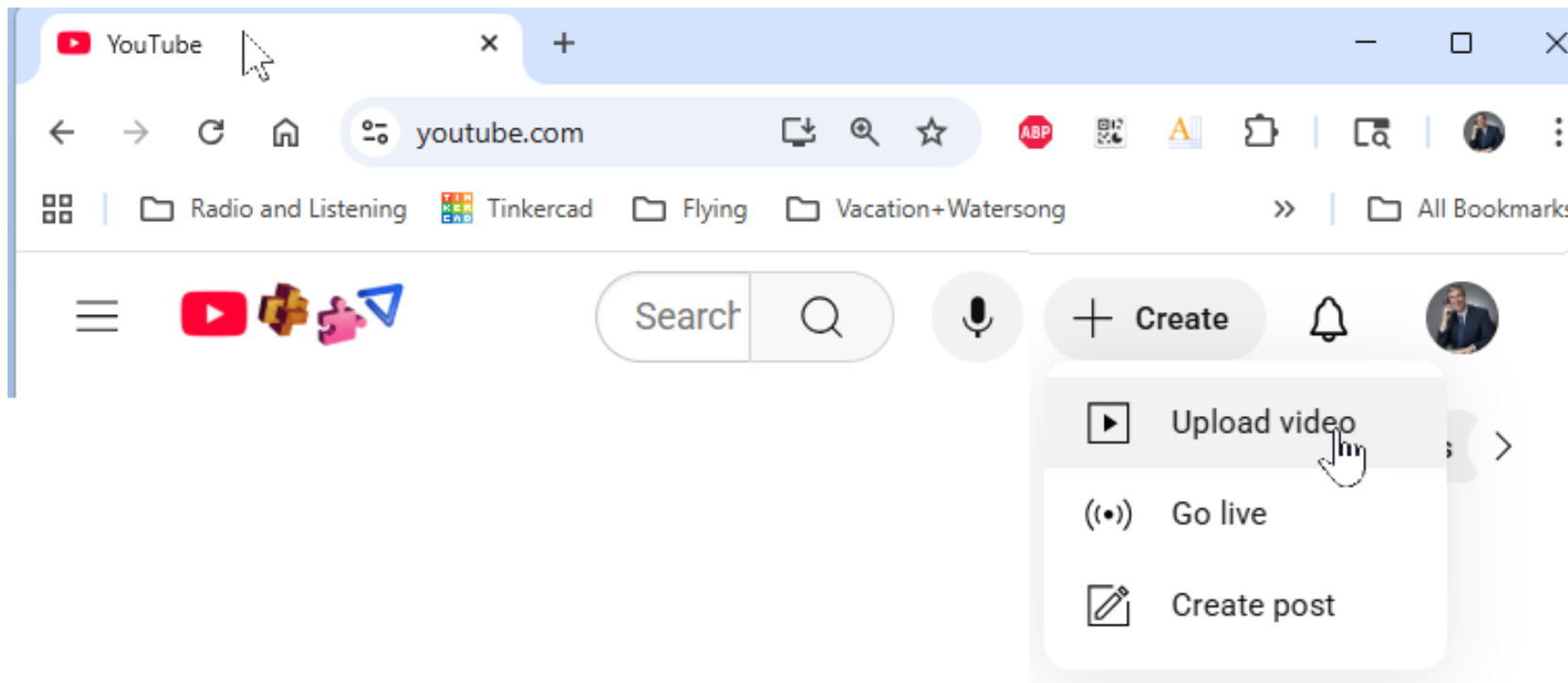
Final Videos OUTSIDE – 360 deg



Posting on YouTube



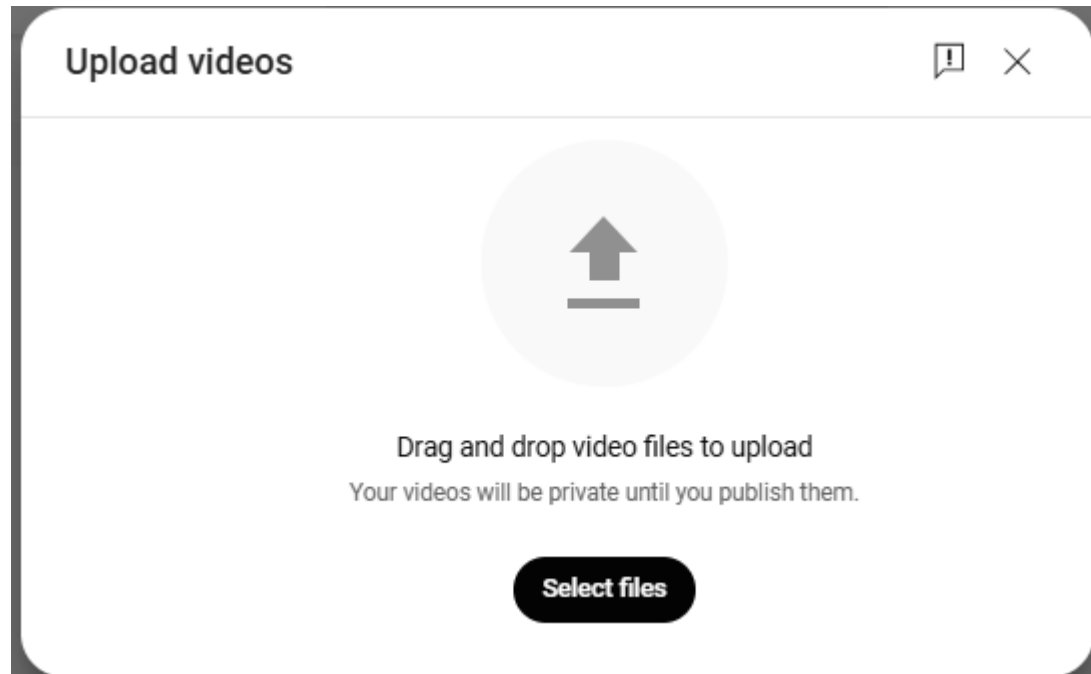
Initially, you have to create a You Tube channel account
Then at the website on your account, just Create/Upload



Posting on YouTube



Drag and Drop (or select from your PC)



Answer a few questions
("YES", it is acceptable for
children...)

Posting on YouTube



Then just copy the link to send to your friends!

3 Cam Akaso 2 Minutes annotated

Saved as private

Details

Video elements

Checks

Visibility

Details

Reuse details

Title (required) ?
3 Cam Akaso 2 Minutes annotated

Description ?
One of three cameras mounted on a Bayou to compare cameras on a Take Off out of KPWK.
I did not engage the EIS Stabilization, so this video i

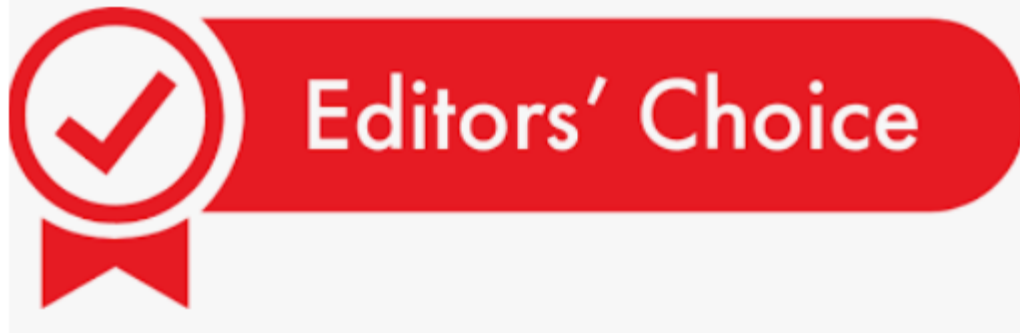
Video link
<https://youtu.be/eAJhFROgPyE>

3 Cam Akaso (2 Minutes) annotated.m...

Thumbnail

Set a thumbnail that stands out and draws viewers' attention. [Learn more](#)

What to buy

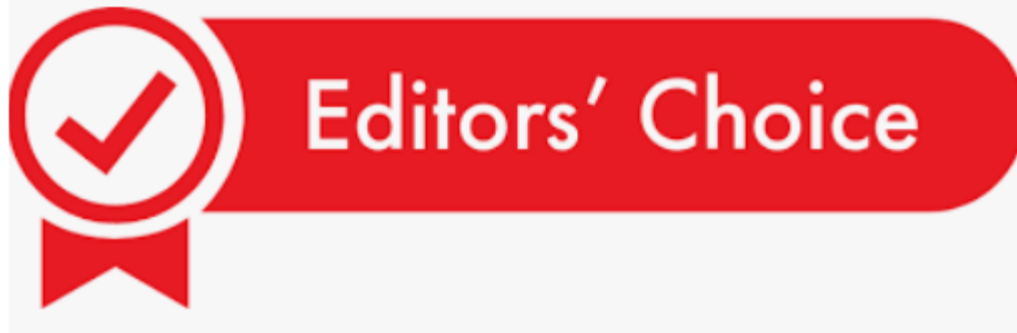


Cockpit:

iPhone (or Equiv)
Quick, easy, 'free'



What to buy



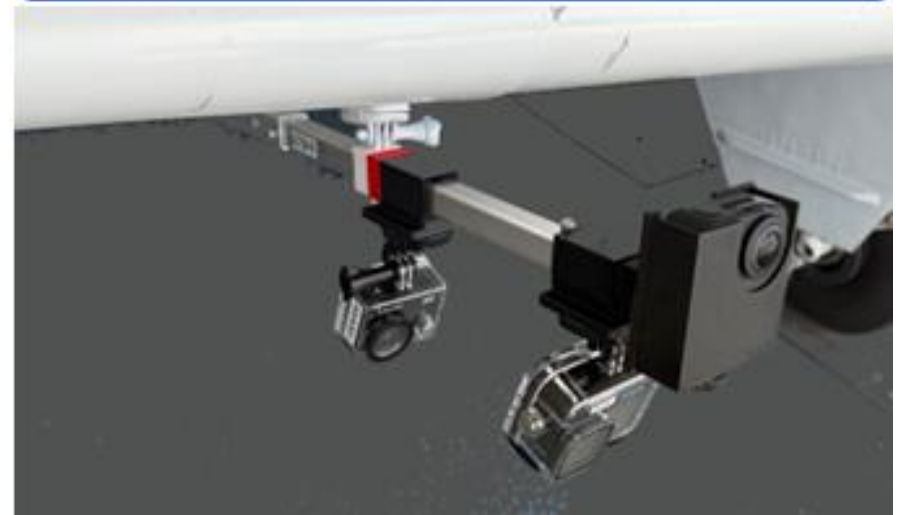
Outside:

Go Pro Max 360

Good Photos, Flexible, 'Wow' effect

DOES require a slight \$\$\$ and learning curve...

CAP Bayonet m mount (\$128)



Where to buy



Complete guide with hyperlinks is available from the website, or contact me: **Henry@N78HF.com**

Description <i>(is Amazon Hyperlink)</i>	Picture	Price	Description <i>(is Amazon Hyperlink)</i>	Picture	Price
AKASO camera EK7000 (Incl protective case)		\$60	GoPro HERO13 Black		\$330
Go Pro Max 360		\$250			
VRIG Phone Holder		\$10	Waterproof Housing Case for GoPro Hero		\$9

Downloads

Aerial Photography Where to buy (pdf)

Download

Where to buy



Complete guide with hyperlinks is available from the website, or contact me: **Henry@N78HF.com**

Digital Voice Recorder		\$26		6.35mm to 3.5mm Audio Cable.		\$6
Friction glue		\$8				

Bayonet Mount options

My Go Flight Maui Pole Mount		\$209	Custom Airplane Parts Bayonet Mount		\$99 + \$29 /mount = \$128
This kit contains 2 surface bases with rubber pad, two clamps and hardware (4 #8 screws, #10 screws, and washers), Choice of 28 or 36 inch aluminum pole with threaded end and stud.			An outer 1" aluminum tube screws to the tie down ring, and an inner 'bayonet mount' tube holds the camera mounts. Nothing is permanently attached and comes on or off in under 2 minutes.		

Where to buy