Filming for Fulgaz – A How To Guide

Introduction

Our ride contributors are the lifeblood of Fulgaz. A steady flow of high quality ride videos from around the world helps us to attract and retain Fulgaz members, to extend the geographic coverage of our Fulgaz ride library, and to organise and support weekly challenges and virtual events. Riding on Fulgaz is fun. Contributing your own rides for others to enjoy is even more fun!

This How To Guide presents a series of checklists to help you film your rides for Fulgaz. It comes from a wealth of experience of the Fulgaz team (in particular Aidan, Klaus, Mike, and Peter) who have filmed rides, and more importantly for this guide, who have worked on hundreds of your contributed rides. We've seen the brilliant, the outstanding, the good, the just about acceptable, and at times, the very bad!

Importantly, these are guidelines, not laws. You should find them helpful rather than restrictive. Please read them carefully and do your best to follow them. We want to showcase your best work. We understand that no-one sets out to purposely film a bad ride, but we do reject rides which we judge to be unacceptable, especially if the rider deviates too far from these guidelines.

If you have questions, please email any of the Fulgaz Ride Engineering team - ***aidan@fulgaz.com, kherrig@gmx.de,*** or ***peter@thekettles.co.uk***.

Equipment

You will need one of the following cameras:

- A GoPro Hero7 (4K/30fps)
- A GoPro Hero8 (4K/60fps)
- A GoPro Hero9 (4K/60fps)

And a GPS, either a Garmin or a Wahoo:

- A Garmin 520,520P, 530, 810, 830, 1000,1030, or 1030P
- Or a Wahoo ELEMNT BOLT or ROAM

We do not accept FIT files from older Garmin devices (500, 800), GPS watches, or Smartphones. If you have a GPS device that is not listed (eg Sigma, Hammerhead), be sure to let us know when you send us your test footage.

You will also need:

- A GoPro-compatible microSD card. A 128GB SD card has capacity for about 4 hours of video, that's enough to record several rides onto the same card. Here is a list of compatible cards:

    https://community.gopro.com/t5/en/SD-Cards-that-Work-with-GoPro-Cameras/ta-p/394308
- A K-Edge "out-front" mount or a rigid alloy equivalent – see pictures below
- A Speed sensor
- An external battery/power pack if you are planning ride videos of more than 1 hour
- Cables, cable ties, as required

GoPro Hero7 settings

Refer to the Hero7 manual:

- 4K video at 30fps
- Wide Field of View
- Auto Stabilisation
- Protune On
- GPS on

GoPro Hero8 settings

Refer to the Hero8 manual. Save these settings into the camera's Bike preset:

- 4K video at 60fps (H.264+HEVC video encoding)
- Wide Lens
- Hypersmooth 2.0 On
- Protune On, all defaults
- GPS on

GoPro Hero9 settings

Refer to the Hero9 manual. Save these settings into the camera's Activity preset, or create a new preset:

- 4K video at 60fps (H.264+HEVC encoding)
- Anti-Flicker at 60Hz
- Wide Lens
- Hypersmooth 3.0 On
- Protune On, all defaults
- GPS on

A fully-charged camera battery will record about an hour and 20mins of video on the Hero7, just over an hour on the Hero8, and about an hour and 10 mins on the Hero9; the majority of Fulgaz rides are around an hour.

Leave yourself some flexibility for unplanned stops such as traffic, or an unexpected roadside puncture repair. We prefer not to receive rides that end abruptly at speed, usually caused by a flat battery or a full memory card. See **External battery**, later in this section.

GPS settings

Refer to the GPS manual. Turn off Autopause (Garmin and Wahoo) and Smart Recording (Garmin only).

Out-front mount

Mount the camera to your bike using a K-Edge out-front mount or a rigid alloy equivalent.

Your bike has a pivot point where the tyres touch the road, and any wobbling or swaying as you are riding along will be amplified according to the straight-line distance from the pivot point to your camera. So we prefer the camera to be positioned between the drops (hanging from the mount) rather than above the them (on top of the mount).

Centre the camera lens over your front wheel, and check that you have a clear view - no drops, cables, or tyres.

Your GPS is best mounted on your stem, to reduce the weight on the out-front mount.

The following pictures show my Hero7 mounted on a bent K-Edge out-front mount:

Adjust the camera's tilt on the mount so that the far horizon (eg the end of a long, level street) is centred vertically in the viewfinder.

The following pictures show the view through a camera which is tilting upwards (Left, too much sky) and the view when centred on the far horizon (Right, a 50:50 split of sky and road where the road meets the horizon):

The far horizon is too low; too much sky   The far horizon is centred

Speed sensor

Attach a Speed sensor (eg Garmin, Wahoo) to the front or rear axle and pair it to your GPS device. The more precise the speed signal is, the more accurate the resulting gradient in the App. This is because gradient data is not stored on the GPS device; we calculate it from the speed and elevation data during the Ride Engineering step (see later).

In challenging GPS environments such as under a forest canopy, in steep gorges or next to cliffs, or when filming "downtown rides" near to high buildings, a speed sensor definitely improves the accuracy of the Fulgaz ride experience.

External battery

If you are planning to film for longer than the internal battery will allow, use an external battery pack such as an Anker Astro E1 Power Bank instead. This has a 5200 mAH capacity (later versions have 6700mAH), approx 4x more than the internal battery, enough for around 4 hours of riding.

We advise that you remove the internal battery so that you can be certain that the camera is taking its power from the external battery pack. Remove the camera door (it easily pops off and back on to its hinge), so that you can connect the power cable running from the external battery pack. Substitute camera doors containing a slot for the USB plug are available on eBay; this helps to stop grime (or worse, water if you are caught in a shower) entering the camera.

I keep my battery pack in a section of old inner tube, and wrap it to my top tube with some cling film; this dampens any vibrations and helps to avoid any sticky tape residue on your bike.

eBikes

We are happy to accept footage filmed from eBikes, but please try to your ride your eBike as though it is a normal bike, to deliver a realistic Fulgaz experience:

- Acceleration and braking like a normal bike
- Realistic speed transitions from level to gradients
- Not too fast on hills

The whirring sound of your eBike's motor and gearbox will be audible on the Fulgaz ride.

Motorbikes, other vehicles

With the exception of eBikes, we do not accept footage from powered vehicles.

Planning your ride

Before your first ride, please send us some test footage, just a few minutes, so that we can make a cross-check of all of your settings.

What to film

- What are your favourite rides in real life? Would they look good on the App?
- What are the attributes of your favourite rides on Fulgaz (hilly, scenic, short, long, loop, sightseeing, solo, group, road, trail, race)? Think about that when choosing your route.
- Is there somewhere where you'd like to go to film where you have never ridden before?
- We are always pleased to receive:
    - Local "hidden gems"
    - So-called iconic rides such as Grand Tour mountain passes
    - Rides from new countries and geographies
    - Sunny versions of existing rides
    - 4K versions of existing 1080P rides
    - 4K versions of rides from our Archives
    - New Official Climbs from the UK
    - Sightseeing rides with scenic views
    - "Downtown rides" passing famous buildings and landmarks
  Whatever you choose, please check with us beforehand in case we have the same ride already filmed and waiting in our backlog.
- The Fulgaz community consensus is that "butt rides" are not very enjoyable. So if you are filming a group ride, be sure to maximise your time at the front or at the side of your fellow riders, rather than close behind them
- Post into the Fulgaz Facebook group if you need some inspiration or suggestions
- There are no obvious preferences either way whether to film the downhill return after a long climb; that's up to you

When to film

- Choose a dry day. Sunny days with blue skies and wispy white clouds give the best results. Overcast days with grey clouds are OK, but be wary of rain showers.
- The light is best from mid-morning to early evening. A high sun means plenty of light and short shadows.
- A low sun means longer shadows, dark areas and a loss of definition. Riding next to hedgerows or under trees can create a "flashing" effect as sunlight finds its way through gaps in the foliage. If you are riding with a low sun, try to keep it behind you rather than riding towards it, as a low sun will amplify any grime or specks of dust on your lens
- Avoid riding in wet or foggy weather, or after rain showers when the roads are likely to be wet, or after prolonged rain when there are likely to be puddles. Your front wheel will throw up a fine mist and/or drops of water, this is guaranteed to land on your camera lens and it will cause blurred areas and smears to appear in the footage.
- If you get caught by a rain shower, all bets are off. You might be lucky with just a spot or two of rain hitting your camera lens and being quickly cleared away by the wind.
- Avoid blustery conditions, these can wreak havoc with your GPS altimeter which relies on air pressure to measure your elevation
- Avoid times when the traffic is likely to be busy – especially the morning and evening rush hours, and school drop-offs and pick-ups.

Where to film

- Make sure that your route is navigable by bike. Stay off footpaths, stairways, verges and other pedestrian-only areas. When you are riding, be on the lookout for "No Cycling" signs, "No Entry" signs, "One Way" signs, and so on.
- Try to avoid tunnels with gradients (admittedly, this can be very difficult if you are in the mountains). There isn't enough light in a tunnel for the camera to capture a good quality image, so unless they are very short, we will edit them out. That can result in a steep ramp in the gradient to deal with the elevation difference between the tunnel entry and exit.
- Especially bumpy routes do not work so well on the Fulgaz ecosystem. Gradient and resistance data is sent to trainers at 1Hz, and there are mechanical limitations on trainers which tilt. It is impossible to accurately reproduce the experience of a rough MTB trail where the bike might be pitching violently several times in only a few seconds.
- If you are filming a loop, it's very important that you end the ride within a few metres of your starting point, and that you are facing the same direction as when you started.

Before your ride

There are two sections here, preparing in the days and hours before your ride, and preparing in the final few minutes before you actually start riding.

In the days and hours before your ride:

- Charge all of your devices (GPS, internal camera battery, external battery pack).
- Check all other devices are working and connecting to your GPS (Speed sensor, RPM sensor, Power meter, HRM).
- Check that you have Autopause turned off (Garmin and Wahoo) and Smart Recording turned off (Garmin only) on your GPS device.
- Remove all the unwanted files from your camera's microSD card.
- Check your camera settings including the date and time, which can go AWOL if you remove the internal battery
- Clean the camera lens
- Your GPS has a tiny hole which allows the ambient air pressure to reach the GPS altimeter, which measures your elevation. Check that this hole is not blocked.
- Clean and lube your bike so that it won't squeak during your ride.

Immediately before riding:

- Switch on your GPS at least a few minutes before you start filming, to allow it to lock on to some satellites. A ride video without accurate GPS data available at the very start is tricky for us to recover. If you're going on a longer ride but filming only a part of it, it's OK to record the whole ride on your GPS (for example, for your Strava upload). We can easily find the GPS data that we'll need to match your ride video.
- Give the camera lens a wipe with a dry cloth, eg the sleeve of your jersey, to remove any specks of dust or finger-marks.
- Switch your camera on and check that the correct preset is selected (eg "Bike"). With your bike vertical, check that the far horizon is level and split 50:50 sky/land in the camera's viewfinder. Check that your drops and front wheel are not visible, and that all cables are routed safely out of sight.
- If you are going to film a loop, make a mental note of your start point and remember to end the ride facing the same way. Use a lamppost, a street sign, a drain cover, a gate, etc, as your start/end ride marker
- Set your camera recording; it will beep and you will see the elapsed time running in the viewfinder.
- Try to have your bike vertical. You may need to unclip and get out of the saddle; if so push off gently and clip in once you are rolling.
- Wait for a gap in the traffic before setting off.
- If you are near to some traffic lights, set off so that the lights will be green when you reach them
- A dropped or waved hand in front of the camera just before you set off is helpful for us to synchronise the GPS and the ride video.

You may feel nervous and awkward during the first few minutes of riding, but that will soon wear off and you'll be able to enjoy your ride as usual.

During your ride

Try to ride as smoothly as possible; the most important objective is to produce the highest quality and stable video with minimal swaying. It is not to show everyone how fast you can ride, or to set new segment PRs; save that for a day when you are not filming.

- Always leave all your devices running, all of the time, even if you make a wrong turn or stop for refreshments or repairs. By implication, do not stop to change batteries during a ride.
- Stay in the saddle at all times. If you are grinding uphill, change to an easier gear rather than getting out of the saddle and/or swaying or weaving.
- Ride smoothly at about 85% of your usual speed; remember that the App adjusts the speed of the video according to the rider's power.
- Keep chatter with other riders to a minimum. The GoPro built-in stereo microphone will pick up your personal conversations and any abusive language which you may regret.
- Try to keep your hands at/towards the outer ends of your bars, rather than towards the stem; this helps for smoother control.
- If you have to stop (eg junctions, traffic lights, pedestrian crossings), stay calm and don't panic:
    - Slow to a smooth stop and then accelerate away gently afterwards.
    - Stay stationary if you can, try not to creep forwards in slow moving traffic; that makes it very hard for us to make a clean edit.
- At junctions, it's always better to make a clean stop rather than wobbling and weaving along the road, hoping not to unclip.
- If you miss a turning, stay calm and don't panic:
    - Turn around, retrace your route to approx 200-400m before you made the mistake.
    - Ride through again at the same speed as previously, and at the same positioning in the road.
    - We'll make a seamless edit to remove the wrong turning, as best as we can.
- Similarly, it's OK if you do want to stop for refreshments or repairs:
    - Restart from approx 200-400m before your stop
    - Ride through again at normal speed.
- If you need to wipe the lens, slow to a smooth stop first, rather than attempting to do it whilst you are riding. Check the lens and the viewfinder before setting off; it's easy to make matters worse and leave smearing on the lens. Ideally, restart from approx 200-400m before your stop.
- Do your best to observe Fulgaz cycling etiquette:
    - Obey the local rules and laws (in the UK we have the Highway Code).
    - Stay safe and respect other road users
    - Do not take any undue risks that endanger yourself or others
    - Stay off footpaths, stairways, verges and other pedestrian-only areas.
    - Do not ride on private property without the owner's permission.
    - When you are riding, be on the lookout for "No Cycling" signs, "No Entry" signs, "One Way" signs, and so on
    - Give way to pedestrians, horse riders, children
    - Do not jump red lights
    - Keep personal conversations to a minimum
    - Please, no abusive language

After your ride

- At the end of your ride, slow to a smooth stop and try to keep your bike vertical. You may need to unclip and get out of the saddle. This is especially important if you are at a viewpoint; distant mountains and lakes look much nicer if they are level!
- Wait for a few seconds before stopping the recording.
- If you've filmed a loop, remember to stop within a few metres of your starting point, and make sure that you are facing the same direction as when you started.
- If you have filmed a climb, ride through the summit rather than stopping; that helps with the segment.
- Leave your GPS switched on for a few seconds (just count to 10 slowly) or you can leave it running for your ride home.

Sending your ride to Fulgaz

Your footage and GPS data are unique and very precious! We recommend that you save them to another device as soon as possible after your ride. If you are a Windows user, attach your devices to a USB port, switch them on, and they will show up in File Explorer.

You will need to find and save:

- The MP4 files from your camera; each will be 4GB (except for the last one), about 8 mins of footage in each. We do not need the LRV or THM files; you can delete these.
- The FIT file directly from your GPS device. Please do not send us a GPX file or any post-processed version of the FIT file (eg, a download from Strava or Garmin Connect).

   You may need to consult your GPS device's manual to locate the FIT file.

Save the MP4 files and the FIT file into the same folder, check that all of the MP4 files are present, and check that the dates and times all match. Do not try to edit the MP4 files or apply any filters before sending them to us. If you have more than one ride, create separate folders for each of them. If the rides share a FIT file, make a copy of it for each ride.

Please do not name any of your folders "Fulgaz" or similar.

And before you forget the details, create a short text file (MS-Notepad, MS-WordPad) containing any helpful information about your ride. It is useful for us to know:

- Its approximate duration and distance
- Its approximate starting point; ideally a geographic location and a start time. "Starts in Low Wath Rd, Pateley Bridge. Look for the hand-drop after approx 20 secs in 0230001.MP4"
- A list of any stops or near-stops, wrong turns, and so on. "Traffic lights at about 10 mins", "Wrong turn in Otley, at about 32 mins", "Brief stop/near miss with a truck at around 57 mins".

And please include:

- Your Fulgaz login ID (your Fulgaz email address)
- A draft Ride Description to appear in the App alongside your ride. We'll edit it to fit in the available space.
- Suggestions for any notable segments that you'd like to see appear during the ride; upload your FIT file to Strava and then simply copy and paste the segment URLs from your browser's address bar. We'll use these to create equivalent virtual segments in Strava.

We'll try to include up to 4 segments, according to the length of your ride.

Please review all of your footage before you send it to us. Use this extensive How To guide as a checklist. It's more agreeable for everyone if you make the responsible decision to reject a poor quality ride video, rather than waiting to hear the bad news from us. Remember, we want to showcase your best work.

Depending on your playback device's graphics capabilities, the HEVC (High Efficiency Video Encoding, an alternative name for H.265) format of the 60fps MP4s from the Hero8 and Hero9 may require an

additional codec to be installed before the MP4s will play smoothly. Windows Media Player and PotPlayer can be configured to support HEVC, but not VLC Media Player.

Use Google Drive, Dropbox, or your preferred alternative to upload your MP4s, FIT, and accompanying text files into the cloud.

You can expect each MP4 file to take a minimum of 30 mins to transfer into the cloud; this is dependent on your ISP's upload speed. This is task that is best run overnight when you are not using the internet for your usual browsing and streaming.

When the upload has finished, share the folder(s) with ***aidan@fulgaz.com***.

So far, we have not been able to set up a publicly accessible folder for everyone to use, but we are keeping this under review.

A checklist summary:

- Save the MP4 files from your camera; we do not need LRV or THM files. Do not edit them, apply filters, etc.
- Save the FIT file from your GPS device
- One folder for each ride; copy the FIT file if it is shared by multiple rides. Avoid naming folders "Fulgaz" or similar
- Check that the dates and times match (MP4 files and the FIT file)
- A text file containing any important ride notes, your Fulgaz login ID, a draft Ride Description and, suggestions for segments

- Please review the footage before you send it to us
- Google Drive, Dropbox, or similar to upload; allow a minimum of 30 mins per MP4
- Share the folder(s) with ***aidan@fulgaz.com***

Behind the scenes at Fulgaz Ride Engineering

We aim to have your ride ready for you to test within 3 months of receipt, although we can usually complete the work much sooner, depending on the length of our ride backlog (we are especially busy after the northern hemisphere summer), how much manual effort is required to create an accurate Ride Control file (see below), and higher priority projects jumping to the head of the queue.

We expect an "average" ride to need between 10 and 25 hours of effort; this can be much longer if there are lots of edits required, or if the GPS data is especially poor.

The Fulgaz Video Engineering team will download your ride from the cloud, and after reviewing the footage, will apply any necessary edits and then create the compressed 4K, 1080P, and 720P ride videos; these are what you'll actually ride in the App.

Once the ride videos are ready, the Fulgaz Ride Engineering team can build the Ride Control file using the different components from your ride:

- The (edited) ride video
- The elevation and gradient profile in the FIT file
- The speed profile in the FIT file

We apply a combination of smoothing filters and manual adjustments to align the ride components, in particular making multiple cross-checks against the ride video to ensure that the gradients are accurate as possible, before adding the segments and final tests with our in-house Fulgaz robot rider.

There is a phrase "Garbage In, Garbage Out". If your ride video deviates too far from our filming guidelines, and/or if the GPS data is too bad for us to work with, we will stop work and reject your ride.

Testing your ride

You will be contacted by the Fulgaz Ride Engineering team when your ride is ready for you to test. You'll find it in the Test Rides section of the App.

No amount of automated testing can replace a through and careful real-world test by the ride contributor, who usually has intimate local knowledge of the ride's particular quirks. This is the final opportunity for you to check that the ride is good enough for general release to the Fulgaz community.

Download your ride, and test it in Reactive mode. Check for, and make notes ideally on a distance scale:

- The ride start and end points are correct
- The gradient alignment is correct; the gradient read-out in the App, the on-screen ride video, your trainer's resistance, and your trainer's tilt are all in sync
- The gradients match the real world; they're not too steep or too shallow
- There are no unexpected or missing slopes
- The segment(s) pop up at the correct place(s)
- There are no unexplained "Benny Hill" sections

- And anything else that you think is odd

For example, you might discover "The gradient is too steep at 6.7Km", "The ride video seems to slow down at 14.5Km", "The gradient near the top of the hill at 15.6Km starts to unwind too early", "There is a spelling mistake in the 3rd pop-up segment"

All being well, and perhaps after a retest if necessary, your ride will be queued for a Fulgaz Top-Up-Tuesday and you can look forwards to receiving lots of congratulatory and well-deserved comments from the Fulgaz Facebook group 😊

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