# 24h Timebuster/TimeHBusteR Settings - Mission statement

The main objective of these settings is to achieve a 24h Recording Length (RL) at slow shutter speeds (SSs) and ISO160 of any kind of changing subject in any kind of lighting with consistently the best image quality (IQ) possible by sacrificing only one of the 1080 available modes on the GH2. Additional flexibility was insured to allow the user to combine these settings with others, target other SSs or establish a different compromise between IQ and RL. PTTools 3.64d(+) is needed. The relevant discussion about these settings can be found [here](http://www.personal-view.com/talks/discussion/2135/gh2-2.5fps-avchd-24h-timebustertimehbuster-2.0-settings-the-day-is-not-over).

# Primary Goals

Goal 1 – Record for 24h straight on a given slow shutter in a way that we consistently have one Frame with the best constant IQ every time the subject changes and drop quality on all other repeated frames that don’t record any changes at all.

Means – This was achieved with:

1. Marrying ***1080i50 and 1080p24 GOP Size*** to the desired SS. This way we end up with what looks like a Full Intra recording because it guarantees one I-Frame (recorded with the best IQ) for every subject change. This must be set according to [the following table](http://www.personal-view.com/talks/uploads/thumbnails/FileUpload/1b/535dfdee7a15f106829ebcaf14c4b6.png):

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Ideal GOP** | | | | | | | | | | |
| **Mode\SS(fps)** | **2** | **2.5** | **3.2** | **4** | **5** | **6** | **8** | **10** | **13** | **15** | **20** |
| **24p** | **13** | **10** | **8** | **7** | **5** | **4** | **4** | **3** | **2** | **2** | **2** |
| **HBR 25p** | **13** | **10** | **8** | **7** | **5** | **4** | **4** | **3** | **2** | **2** | **2** |
| **HBR 30p** | **16** | **12** | **10** | **8** | **6** | **5** | **4** | **3** | **3** | **2** | **2** |

1. Filling ***1080p24 Scaling P/(B)*** tables with **0xFFFF**. This sets the **least** bit rate possible to the P/(B) frames since those will be dropped because they are duplicates and we just made sure they have very low IQ. As a consequence **most** bit rate allocation is now reserved for I-Frames, which are the ones that will be used for the workflow.

1. Setting ***Quantizer for 1080 modes*** defines a compromise between IQ and RL that will insure that we’ll have the bit rate usage under control so that the SD Card capacity will hold enough for 24h (or any other time span we desire).

**Note:** ***Encoder setting 1 1080i/p*** has to be set to **3** in order to have ***Quantizer for 1080 modes*** respected by the encoder. This undesired workaround enables B-Frames which have a ~6% bit rate penalty in the final bit rate (they end up ~3x bigger than P-Frames) but it was one sacrifice needed to achieve a Constant Quantizer and thus Constant Quality.

Goal 2 – Make these settings as simple, effective and enclosed as possible, so they can be combined together with the user’s favorite choice of merger with the *least impact* possible.

Means – This was possible because:

1. Very few parameters (only 4) were used and the ones that were, are either mostly inconsequent, or in line with other developer’s settings.
2. The unorthodox nature of the way the footage is captured (with lots of temporal redundancy) and the way the parameters are changed, are just relaxing the constraints of the encoder.

24h Timebuster was merge tested earlier against FlowMotion 1.11, Cake 95 and one contemporary (can’t recall which) version of GOP3ZILLA with no undesirable effects observed. Due to it’s nature which only taxes I-Frames, it should be merged with settings that use a very high ***1080p24 Frame Limit***, especially when pushed with a much lower ***Quantizer for 1080 modes*** than the default it’s using. For that extreme case, I seriously recommend Cluster V1.

Goal 3 – Allowing the user the choice to target which mode to sacrifice while keeping the other modes as functional as possible and opening the doors to a lot of [360º shutter angles](http://www.personal-view.com/talks/discussion/2396/gh2-motion-fluidity-360º-shutter-test-on-slow-shutter-speeds.) on timelapses.

Means – This was only made possible by releasing two variants:

1. **24h Timebuster** - which targets the 1080p24 mode and keeps 1080i, HBR25/30 and VMM modes as functional as possible. This is the ***most efficient variant*** because it can trash both P-Frames and B-Frames to reserve bit rate for I-Frames.
2. **24h TimeHBusteR** – which (as the name indicates) targets **HBR**30 and also **HBR**25 (seriously impairing 1080i and VMM) but preserving in its best the 1080p24 Cinema mode. Due to the interlaced nature of the encoded frames this variant can’t trash P-Frames, so it’s a *little bit* less efficient than **24h Timebuster**. This is however the ***most flexible variant*** because it gives you access to a plethora of 360º shutter angles which are being [discussed here](http://www.personal-view.com/talks/discussion/2396/gh2-motion-fluidity-360º-shutter-test-on-slow-shutter-speeds) and you can see in [the following table](http://www.personal-view.com/talks/uploads/thumbnails/FileUpload/1b/535dfdee7a15f106829ebcaf14c4b6.png):

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Measured Fluidity (360º/ShutterAngle)** | | | | | | | | |
| **Mode\SS(fps)** | **2** | **2.5** | **3.2** | **4** | **5** | **6** | **20** |  |
| **24p** | 94% | 97% | 96% | 85% | 96% | 95% | 36% |  |
| **HBR 25p** | 97% | FLUID | FLUID | 90% | ***\*FLUID\**** | FLUID | 43% |  |
| **HBR 30p** | 94,7% | ***\*FLUID\**** | 96,1% | 95,8% | FLUID | 95,9% | 67,9% |  |

With flexibility in mind, this variant goes one extra mile beyond tuning HBR30@2.5fps and it trades a possible hit on 24p by changing ***1080i50 and 1080p24 GOP Size*** to **5** but in the process it adds an interesting \*sweet spot\* (HBR25@5fps) to timelapsing.

**Note:** For those who don’t want to risk 24p in any way, just uncheck ***it*** before merging.

# Secondary Goals

Goal 4 – Allow the user the choice for other SSs by providing an easily adjustable GOP according to its creative needs.

Mean – This is achieved with:

1. Adjusting ***1080i50 and 1080p24 GOP Size*** to marry the desired SS is essential if the user feels the footage benefits from using a faster SS than default. Again this must be set according to [this table](http://www.personal-view.com/talks/uploads/thumbnails/FileUpload/1b/535dfdee7a15f106829ebcaf14c4b6.png):

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Ideal GOP** | | | | | | | | | | |
| **Mode\SS(fps)** | **2** | **2.5** | **3.2** | **4** | **5** | **6** | **8** | **10** | **13** | **15** | **20** |
| **24p** | **13** | **10** | **8** | **7** | **5** | **4** | **4** | **3** | **2** | **2** | **2** |
| **HBR 25p** | **13** | **10** | **8** | **7** | **5** | **4** | **4** | **3** | **2** | **2** | **2** |
| **HBR 30p** | **16** | **12** | **10** | **8** | **6** | **5** | **4** | **3** | **3** | **2** | **2** |

Goal 5 – Allow the user the choice to establish a compromise between IQ/Recording Length according to its capture/IQ/card capacity needs.

Mean – This is achieved with:

1. Adjusting ***Quantizer for 1080 modes*** by favoring either IQ or RL. As noted earlier, this necessity prompted the need to enable B-Frames, for which a ~6% penalty in bit rate had to be paid. However, the return is too important to be ignored, when it gives absolute and consistent control over IQ. This is easily justified if you think in a very simplistic way that you can have twice the IQ if you just record for 12h instead of 24h. QPs as low as **QP=16** were tested and theoretically it could go as low as **QP=12** @ISO160 when merged with stock matrix settings.

# Using the settings

Distribution – These settings are distributed [here](http://www.personal-view.com/talks/discussion/2135/gh2-2.5fps-avchd-24h-timebustertimehbuster-2.0-settings-the-day-is-not-over) and as noted before, at the moment they come in two flavors:

1. **24h Timebuster** - which targets the 1080p24 mode for those who want to preserve 1080i, HBR25/30 and VMM modes as functional as possible. ***1080i50 and 1080p24 GOP Size*** was set to **10** to suit a 2.5fps SS.
2. **24h TimeHBusteR** – which targets **HBR**30 and **HBR**25 (also impairing 1080i and VMM) for those who want to preserve the 1080p24 Cinema mode. ***1080i60 GOP Size*** was set to **12** to suit a 2.5fps SS on **HBR30** and ***1080i50 and 1080p24 GOP Size*** **5** to suit a 5fps SS on **HBR25** and an extra sweet spot for timelapsing even though with ***some possible impact*** on 24p Cinema.

Each of these flavors which are found in the equally named zip files, comes itself in two variants inside the zips:

1. **(24h Timebuster**/**24h TimeHBusteR) Base** - which can be used to be merger with a user choice of other settings, for those who want to have a saying in the final result.
2. **(24h Timebuster**/**24h TimeHBusteR) FlowMotion** – which ATM is already pre-merged with FlowMotion 1.11 and is pretty much prepared to flash away, for those who don’t feel confortable merging settings.

Usage – The way the settings should be prepared for use, can be described in the following workflow, but don’t be scared at the number of steps, a typical workflow only includes steps 1, 3 or 4, sometimes 6, 7, 13 and 14:

1. Head to the relevant [thread](http://www.personal-view.com/talks/discussion/2135/gh2-2.5fps-avchd-24h-timebustertimehbuster-2.0-settings-the-day-is-not-over/p1) or the settings [vault](http://www.personal-view.com/talks/discussion/comment/40074#Comment_40074).
2. Which 1080 mode flavor do you want to keep most functional for regular footage? If your answer is Cinema 24p then go to 4.
3. Download **24h Timebuster** and extract to your PTTOOLS folder. Go to 5.
4. Download **24h TimeHBusteR** and extract to your PTTOOLS folder.
5. Are you uncomfortable merging settings. Don’t you know or have a preference for other developer’s settings? Do you feel more comfortable with the well tested and tried FlowMotion, instead? If so then go to 7.
6. Download your choice of merger and extract it to your PTTOOLS folder. Rename settings file if it exists already.
7. Fire up PTTOOLS, load your flavor of **24h Timebuster/TimeHBusteR**.

**Note**: If on step 5) you have chosen to merge, then you’ll be loading the **Base** Variant in this step, otherwise you’ll be loading the **FlowMotion** Variant.

1. Are you going to use the default 2.5fps shutter speed? If so, go to 10.
2. Adjust ***1080i50 and 1080p24 GOP Size*** as mentioned on Goal 4.
3. Do you need to record 24h of footage on ISO160 or are you already satisfied with the default IQ? If so go to 12.
4. Adjust ***Quantizer for 1080 modes*** (Q) by favoring either IQ or RL. Bear in mind that a 6 unit decrease in Q will roughly *double the bitrate* / *halve the RL* and the same happens when you raise the ISO by 2EVs. Going just 1EV from ISO160 to ISO320 will roughly *increase the bitrate / reduce the RL* by only 50%.
5. If you went through step 6 and choose a favorite merger, now is the time to merge by “Alt + Clicking” it.
6. Save Firmware. Flash. Set [camera to MF](http://www.personal-view.com/talks/discussion/comment/39079#Comment_39079). Set your previous choice of 1080 mode and shutter speed. Go film!!!
7. Load footage. [Delete duplicate frames](http://www.personal-view.com/talks/discussion/comment/49325#Comment_49325).

# Wishlist and Feature Requests

Wishlist – I wish I could find a simple way to enforce the quantizer parameter without having to resort to B-Frames. They introduce complexity everywhere and are 2.5x - 3x larger than P-Frames when starved with my method. I have abstained myself from trying Auto-Quantizer modes, as I believe they might compromise predictability in RL and have more impact on other settings.­­­

Feature Request – I wish Vitaliy could find a way to automatically marry a variable frame rate to SSs slower than 25fps. This way the encoder wouldn’t need to record duplicate frames that currently take up space but don’t record any new content. We already have something similar for MJPEG even though it is fixed before patching.

Feature Request – I wish Vitaliy could find a way to disable audio automatically on SSs slower than 25fps. It wastes precious bit rate that could pay for a 1 unit raise in the quantizer parameter.