ENHANCMENTS

These are the enhancements and extensions that 400plus provides.

[**Safety Shift**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#safety-shift)

Safety shift is a nice feature from our camera, used to avoid under/over-exposures in Tv and Av modes, when the metered exposure exceeds the limits of the lens and/or the camera.

In Tv mode, the camera will lower the shutter speed set by the user, when the scene require an aperture larger than the lens can provide; and it will raise the shutter speed set by the user, when the scene requires an aperture smaller than the lens can provide. In Av mode, safety shift will override the aperture set by the user, when the scene requires a shutter speed out of the range provided by the camera.

Safety shift is controlled with the "Safety Shift" switch in the [parameters page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#parameters-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu).

[**Spot Metering Mode**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#spot-metering-mode)

The spot metering mode is similar to the *standard* partial metering mode, but the area included in the metering is smaller (approx. 3.5% of the center of the viewfinder, vs. partial metering at approx. 9% of the center of the viewfinder). It works quite well when needed.

To enable the spot metering mode, enter the metering mode selection dialog (press the METERING button from the main dialog) and then press DP; enter that dialog again, and select any other metering mode, to disable the spot metering mode.

[**Custom White Balance**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#custom-white-balance)

The custom white balance option uses the color temperature configured in the "Color Temp. (K)" item from the [parameters page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#parameters-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu) (notice also that changing that value in the menu also sets the white balance to custom, automatically).

To enable the custom white balance, enter the white balance selection dialog (press the WB button from the main dialog) and then press DP; enter that dialog again, and select any other white balance, to disable the custom white balance.

[**Named Color Temperatures**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#named-color-temperatures)

The named color temperatures menu extends the functionality of the custom white balance menu: instead of having to remember several color temperatures for different situations, you can store up to sixteen values here, and assign a name to each one. To set one of the available color temperatures, just press SET; use RIGHT and LEFT to change its value, and JUMP to rename it.

***Note***: Default names for the named color temperatures are assigned the first time you enter this menu, using the language configured in 400plus at that moment; you will probably want to set the language before entering this menu for the first time.

[**AF-Pattern Selection**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#af-pattern-selection)

400plus offers a range of additional AF-Pattern selections, instead of just the two (Manual AF point selection, and Automatic AF point selection) which are included standard in the camera. These additional AF-Pattern selections provide a wide range of multi-point selection patterns, using different combinations of the 9 focus points, for some creative AF capabilities.

To use the additional AF-Pattern selections during shooting, press the ZOOM IN button to enter the standard "AF-Point Selection" dialog, then press the ZOOM IN button again to enter the new "AF-Pattern Selection" dialog. Use the UP, DOWN, LEFT, RIGHT, and SET buttons there to move around the different AF-Patterns available. Half-press the shutter-release button to exit the dialog.

[**Extended Exposure Compensation**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#extended-exposure-compensation)

On the [parameters page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#parameters-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu), 400plus allows to override the default ±2EV limit up to ±6EV on the following parameters:

| ***Item*** | ***Parameter*** |
| --- | --- |
| Av comp | Standard exposure compensation |
| AEB | Separation for the auto exposure bracketing |
| Flash comp | Flash exposure compensation |

[**Flash Configuration**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#flash-configuration)

Flash can be completely disabled, and it will not fire even if has been raised, using the "Flash" > "Disable flash" option in the [parameters page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#parameters-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu).

[**Extended ISOs**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#extended-isos)

Extended (or intermediate) ISOs allow for finer-grained (1/8 EV) control of the ISO parameter for the creative modes.

Extended ISOs are available at the "ISO" item in the [parameters page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#parameters-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu); you can also use extended ISOs with the TRASH or JUMP buttons, if configured (see [configuring buttons](https://github.com/400plus/400plus/wiki/User-Guide%3A-Configuration#configuring-buttons)).

[**Configuring Extended ISOs**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#configuring-extended-isos)

The "Digital ISO step" entry in the [settings page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#settings-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu) controls the size of the step ("1/8 EV", "1/4 EV", or "1/2 EV") used by 400plus for extended ISOs.

[**Some notes about extended ISOs**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#some-notes-about-extended-isos)

* When using extended ISOs, the camera will not always display the correct ISO value; for example, an image shot at ISO-3000 will show as ISO-3200 during the review. This is a limitation of the original firmware.
* *Non-standard* ISO values are software-only calculated values, and technically offer little to no gain over shooting at the standard *base* ISO values and later post-processing the image. They can be useful, however, when there is no time for any post-processing.
* The *missing* ISO-3200. Previous versions of 400plus supported ISO-3200; or more precisely, it *appeared* to support it: while the camera displayed "3200" as the ISO value, images where actually being shot at ISO-3000. Recent versions of 400plus correct this bug, and only values up to ISO-3000 are supported now. Note, thus, that *an image shot at the 'new' ISO-3000 will be exactly the same as if shot with the 'old' ISO-3200*.

[**AutoISO**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#autoiso)

400plus has support for AutoISO in creative modes, using our own algorithms. It works by reading the measurements that the camera makes, when you half-press the shutter button, and changing the ISO value accordingly. The behavior of AutoISO is different for each creative mode, but the idea is roughly the same: use the lowest possible ISO to maintain a suitable speed or aperture.

To enable AutoISO, enter the ISO selection dialog (press the ISO button from the main dialog) and then press DP; enter that dialog again, and select any other ISO value, to disable AutoISO. Alternatively, AutoISO can be configured in the "AutoISO" sub-menu in the [parameters page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#parameters-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu):

| ***Item*** | ***Description*** |
| --- | --- |
| Enabled | When active (set to "Yes"), AutoISO is enabled. |
| Min ISO | Minimum ISO value that AutoISO will use. |
| Max ISO | Maximum ISO value that AutoISO will use. |
| Min Tv | Minimum shutter speed that AutoISO will try to maintain. |
| Max Av | Maximum aperture (relative to maximum aperture supported by the lens) that AutoISO will try to maintain. |
| Relaxed | When active (set to "Yes"), AutoISO in M mode will allow larger exposure deviations. |

[**AutoISO In Av mode**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#autoiso-in-av-mode)

The intention of AutoISO in Av mode is to use the lowest possible ISO that ensures no motion blur.

In normal Av mode, the user selects ISO and aperture, and the camera decides the shutter speed according to the scene. But when AutoISO is active, 400plus will always try to use the lowest possible ISO value (as configured by "Min ISO"), unless the shutter speed gets too low (as configured by "Min Tv"); when that happens, 400plus will automatically raise the ISO value (up to "Max ISO") as needed.

Please, note that when both Safety Shift and AutoISO are enabled, the camera could drop shutter speed below the configured "Min Tv", if "Max ISO" is reached, in order to maintain a correct exposure.

[**AutoISO In Tv mode**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#autoiso-in-tv-mode)

In Tv mode, the intention of AutoISO is to use the lowest possible ISO that ensures an acceptable depth of field.

In Tv mode, AutoISO will try to keep ISO as low as possible (as configured by "Min ISO"), unless the scene requires an aperture larger than desired (as configured at "Max Av"); then, AutoISO will raise the ISO value (up to "Max ISO") as needed.

Please, note that the "Max Av" parameter is the *difference* between the maximum aperture supported by your lens and the maximum aperture that AutoISO will allow before raising the ISO value: for example, on a f/4 lens, setting "Max Av" to +1EV means that AutoISO should raise the ISO whenever the camera sets an aperture of f/5.6 or greater. On a zoom lens with a variable maximum aperture, "Max Av" is always based on the maximum aperture supported by your lens at each moment.

In Tv mode, it is perfectly possible to combine both Safety Shift and AutoISO at the same time: when AutoISO can no longer increase the ISO value, the camera will use a larger aperture, and when the lens' maximum aperture is reached, Safety Shift will force a longer exposure time.

[**AutoISO In P mode**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#autoiso-in-p-mode)

In P mode, AutoISO *tries* to behave just like in Av mode, and will raise the ISO value to keep a minimum shutter speed; but, as the camera decides both aperture and shutter speed in this mode, there is no guarantee that raising the ISO will increase shutter speed: it tends to work correctly for small values of "Min Tv", but for larger values the camera usually decides to close the diaphragm instead of selecting a faster shutter speed.

[**AutoISO In M mode**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#autoiso-in-m-mode)

In M mode, the behavior of AutoISO is completely different to other modes: in this case, the user selects both the aperture and the shutter speed, and 400plus will set the most suitable ISO value to match the scene.

If the "Relaxed" parameter is active (set to "Yes"), AutoISO will allow larger exposure deviations (±2EV), before raising or lowering the ISO value, instead of the default ±1EV. Use this option if you plan to use advanced metering techniques, such as the [zone system](http://en.wikipedia.org/wiki/Zone_System).

You can change the exposure compensation in M mode, if the "Use D-Pad" option is active (set to "Yes"), using the LEFT and RIGHT keys while looking through the viewfinder.

If you change the exposure time up to the BULB mode while AutoISO is active, your camera will emit a short beep, and 400plus will disable AutoISO, and set the ISO parameter to a fixed value of 100.

[**ISO In Viewfinder**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#iso-in-viewfinder)

When the "Use D-Pad" option is active (set to "Yes"), and if the camera is set in any creative mode, you can change the ISO value while looking through the viewfinder:

* Set the camera to M or Tv mode.
* Look through the viewfinder, half-press the shutter button, and release it; you should now see the current measurements (shutter speed, aperture...).
* Now press the LEFT and RIGHT buttons to change the ISO value (or UP just to display it); while the button is kept pressed down, the new value will be displayed in the viewfinder, in the same place where shutter speed is normally shown.

In P and Av modes, ISO can also be changed through the viewfinder, but its value is displayed in the "burst counter" (the single-digit number, at the far right of your viewfinder, that shows the number of shots remaining for a burst), using the following codes:

| ***Burst counter*** | ***ISO value*** |
| --- | --- |
| 1 | 100 |
| 2 | 200 |
| 4 | 400 |
| 8 | 800 |
| 9 | 1600 |

***Note***: When custom function "*01 - SET button/Cross keys funct.*" is set to "*4 : Cross keys:AF frame Selec.*", this feature will remain disabled.

[**Fixed exposure for M mode**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#fixed-exposure-for-m-mode)

While in M mode, 400plus allows you to 'fix' the exposure to a certain value, and keep it stable even if you change the aperture or the exposure time: when you change on of those two values, 400plus will automatically change the other one, in the opposite direction.

For example, suppose you set the camera to 1/100s and f/4.0 and then activate this feature. Now, if you change the exposure time to 1/50s, the aperture will jump to f/5.6; and if you change the aperture to f/2.8, the shutter speed will jump to 1/200s.

To use this feature, the "Use D-Pad" option must be active (set to "Yes"); then, look through the viewfinder and press the SET button. Now you can use the front wheel to change both the exposure time and the aperture at the same time, while the exposure is maintained fixed. Press the SET button again to disable this feature, just wait until the camera stops measuring the scene (speed and aperture will disappear from the viewfinder).

[**Quick exposure for M mode**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#quick-exposure-for-m-mode)

The Quick Exposure for M mode is intended to help you to find a 'good enough' exposure while in M mode; this feature is just like giving a quick peek into P mode.

To use this feature, the "Use D-Pad" option must be active (set to "Yes"); then, look through the viewfinder and hold down the DOWN button. Notice how the exposure and aperture change, and how the exposure indicator (both in the main display and the viewfinder) shows now a value of 0 EV.

For technical reasons, the camera must be measuring for Quick Exposure to work; just ensure that the viewfinder is active (half-press the shutter button otherwise) previous to using this feature.

Once Quick Exposure has set an exposure time and an aperture, you can release the DOWN button, and take a photograph or adjust those parameters to meet your needs.

[**Configuring Quick Exposure**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#configuring-quick-exposure)

There are some configuration options at the "Config. Quick Exposure" item in the [settings page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#settings-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu):

| ***Item*** | ***Description*** |
| --- | --- |
| Min. Tv | Minimum shutter speed targeted |
| Weighting | Weighting method used |

As long as there is enough light in the scene, Quick Exposure will maintain an exposure time shorter than the "Min. Tv" value. But on low light conditions, when even opening the diaphragm to its widest aperture is not enough, Quick Exposure will use longer exposure times to avoid underexposure. Ideally, you might want to set "Min. Tv" to a value around 1 divided by the focal length of your lens.

On bright scenes, the "Weighting" functions controls which exposure parameter (from shutter speed and diaphragm aperture) must be favored to adjust the exposure. When this parameter is set to "Tv", Quick Exposure will tend to use shorter exposure times; use this value for action scenes, for example. When this parameter is set to "Av", Quick Exposure will tend to use smaller apertures; use this value to achieve a greater depth of field. Finally, when set to "None", Quick Exposure will balance between using shorter exposures and smaller apertures.

[**Multi-spot metering**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#multi-spot-metering)

Multi-spot metering is best explained in this [guide from Canon](http://www.learn.usa.canon.com/resources/articles/2011/multispot_metering_markiii_cameras_article.htmlp); basically, it allows you to take more than one metering for a scene, and take a photograph using the average exposure. Multi-spot metering is always active, and does not need to be explicitly enabled by the user, but in only works in P, Tv, and Av modes. The "Use D-Pad" option must be active (set to "Yes") to use this feature.

To use multi-spot metering, follow this procedure:

* Set the camera to one of P, Tv, Av modes.
* Look through the viewfinder, and take a measurement (just half-press the shutter button, so the viewfinder lights up).
* Now, while looking through the viewfinder, press the DOWN button; you'll hear a beep, and 400plus will register that measurement.
* Repeat this procedure to add as many readings as you need; after each reading is registered, the "burst counter" in the view finder will display the number of readings registered (notice that, while the counter has a upper limit of 9, `400plus' does not have a limit on the number of readings you can register).
* If you want to delete the last reading, just press the DOWN button and hold it for two seconds; you'll hear another beep confirming the delete.
* Once you have taken enough readings, press the SET button (keep looking through the viewfinder); 400plus will set your camera to M mode, with the aperture and shutter speed set to the average of the apertures and shutter speeds from the readings registered.
* Take a photograph, and 400plus will automatically revert back to the P / Av / Tv mode you where using.

[**RAW Support For Scene Modes**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#raw-support-for-scene-modes)

While in one of the scene modes, use the AV button to toggle between the following image type settings: JPEG, RAW, and JPEG+RAW. Notice that quality and size are changed to "HIGH+L" each time this option is used, by requirements of the original firmware.

[**IR Settings**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#ir-settings)

There are also some settings related to an infrared remote controller in the [parameters page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#parameters-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu):

| ***Item*** | ***Description*** |
| --- | --- |
| IR remote enable | When active (set to "Yes"), will allow the use of an IR remote; when set to "No", camera will ignore an IR remote. |

***Note:*** Due to a technical limitation, the camera cannot lock the mirror up while using an infrared remote controller; thus 400plus will disable the MLU custom function when an IR remote is active.

[**Shortcuts**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#shortcuts)

While the camera is displaying the main dialog, 400plus can assign special actions to the (otherwise unused) JUMP and TRASH buttons.

***Note:*** Due to a technical limitation, shortcuts are disabled when custom function C.Fn 01 is set to "4:Cross keys: AF frame selec.".

[**Assigning Shortcuts**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#assigning-shortcuts)

Use the [the button configuration menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-Configuration#configuring-buttons) to assign a shortcut to the JUMP and TRASH buttons; the following shortcuts are available:

* Repeat last script
* Better DISP button
* Intermediate ISO
* Mirror lock-up
* Flash on/off
* AEB

[**Using Shortcuts**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#using-shortcuts)

The "Repeat last script" shortcut just executes again the last script that was executed before; the other shortcuts behave a bit different:

* The button assigned to the shortcut must be held down for the shortcut to be active; as soon as the user releases the assigned button, the shortcut finishes, and the camera behaves normally.
* Use the LEFT, RIGTH, UP, DOWN, and SET buttons to operate the shortcut (each shortcut gives a different meaning to each button, see below for a detailed explanation).
* In the main display, instead of the number of remaining shots in the card, 400plus will show the name of the active shortcut; and instead of the ISO value, 400plus will display some info about the active shortcut (see below for details).

[**Better DISP button**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#better-disp-button)

Use this shortcut to quickly change the display's brightness. The "DISPL" text is shown instead of the number of remaining shots available; and the current display level (from 1 to 7) is shown instead of the ISO value. Use the following buttons to operate this shortcut:

* LEFT: Reduce brightness.
* RIGHT: Increase brightness.
* UP: Increase brightness to the maximum.
* DOWN: Decrease brightness to the minimum.

[**Intermediate ISO**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#intermediate-iso)

Use this shortcut to quickly change the ISO value, including intermediate values. The "ISO" text is shown instead of the number of remaining shots available. Use the following buttons to operate this shortcut:

* LEFT: Decrease ISO one step.
* RIGHT: Increase ISO one step.
* UP: Increase ISO to the next native value.
* DOWN: Decrease ISO to the next native value.
* SET: Toggle AutoISO.

[**Mirror lock-up**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#mirror-lock-up)

Use this shortcut to quickly configure the mirror lock-up feature. The "MLU" text is shown instead of the number of remaining shots available; and the current status of the feature ("On" / "Off") is shown instead of the ISO level. Use the following buttons to operate this shortcut:

* SET: Toggle mirror lock-up on / off.

[**Flash on/off**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#flash-onoff)

Use this shortcut to quickly configure the flash in your camera. The "FLASH" text is shown instead of the number of remaining shots available; and the current status of the flash plus the synchronized curtain ("On" / "Off" / "2nd") is shown instead of the ISO level. Use the following buttons to operate this shortcut:

* LEFT: Decrease flash exposure compensation one step.
* RIGHT: Increase flash exposure compensation one step.
* UP: Increase flash exposure compensation to the next full stop.
* DOWN: Decrease flash exposure compensation to the next full stop.
* SET: Toggle flash on / off.
* AV: Toggle 2nd curtain on / off (when flash is on).

[**AEB**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#aeb)

Use this shortcut to quickly configure the AEB feature from your camera. The "AEB" text is shown instead of the number of remaining shots available; and the current separation is shown instead of the AEB symbol. Use the following buttons to operate this shortcut:

* LEFT: Decrease the AEB one step.
* RIGHT: Increase AEB one step.
* UP: Increase AEB to the next full stop.
* DOWN: Decrease AEB to the next full stop.
* SET: Toggle AEB on / off.

[**The DISP button**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#the-disp-button)

When the "Better DISP button" is active (set to "Yes") in the [settings page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#settings-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu), the DISP button can also act as a shortcut, but with some differences:

* Only the "Better DISP button" shortcut is available.
* The DISP button must not be held down, just pressed and released once.
* After adjusting the desired display brightness, press SET to exit the shortcut.

[**Standard Initialization**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Enhancements-and-Extensions#standard-initialization)

To temporarily switch 400plus completely off (for example, if you believe 400plus is making your camera act weird), just press the TRASH button while the camera is powering on; the blue LED will not flash, and the camera will act as if 400plus had never been installed. Notice that this change is not permanent, and you must hold the TRASH button each time the camera powers on, even when waking up from an automatic power off.

SCRIPTS

To launch a script, just select it in the [scripts page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#scripts-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu) and press SET (unfortunately, scripts *still* cannot be launched using the shutter-release button). When a script starts or stops, a *beep* will be heard; and while a script is running, the DP button will flash (approx. twice per second, by default). To stop a running script, press the DP button again; sometimes the camera may not stop immediately, so hold the DP button until you hear a *beep* that signals the effective end of the script.

You can also pause a running script, by means of simply pressing the DISP button: this will put the camera into a low-power mode, and effectively stop all ongoing activity; press DISP again, to bring back the camera into life, and the script will continue normally. All scripts will check the card capacity before each shot; if the estimated number of shots available is lower than a fixed value (3), the scripts will stop executing.

[**Extended AEB**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#extended-aeb)

This script performs the same task as the *standard* AEB option from the camera, but with a few nice enhancements:

* Up to 9 shots may be specified.
* The separation between shots is configurable up to ±6 EV.
* The camera will take all the shots in a sequence, automatically.
* User can specify the *direction* of the sequence.

To configure and launch the Extended AEB script, use the "Ext. AEB" sub-menu in the [scripts page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#scripts-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu):

| ***Parameter*** | ***Description*** |
| --- | --- |
| Delay | Select whether this script should start shooting immediately or wait for 2 seconds. |
| Frames | The number of frames (shots) the script should take. Values range from 1 to 9. |
| Step (EV) | The separation in EV (exposure value) between each frame (shot). Values range from +1/3EV to +6EV. |
| Direction | Specifies the *direction* of the EAEB sequence. |
| Bulb min | The minimum shutter speed in BULB mode. Values range from 1/4000th of a second to 32 minutes. |
| Bulb max | The maximum shutter speed in BULB mode. Values range from 1/4000th of a second to 32 minutes. |

Supposing a configuration of 5 shots at 1EV separation, this is how each *direction* is supposed to work:

| ***Value*** | ***Meaning*** |
| --- | --- |
| +/- | One photo at current EV, and the rest above and below it: 0EV, +1EV, -1EV, +2EV, -2EV. |
| + | One photo at current EV, and the rest above it: 0EV, +1EV, +2EV, +3EV, +4EV. |
| - | One photo at current EV, and the rest below it: 0EV, -1EV, -2EV, -3EV, -4EV. |

***Note:***

Previous versions of this script just adjusted the EV compensation between shots; this method has one major drawback: if the light in the scene changes during the sequence, the camera may change the exposure settings between shots, and this script will end applying different compensations to unrelated exposures; the final result is not what the user would expect.

Newer versions fire the first shot without changing any parameter, but the settings used by camera get recorded; then, the camera is set into M mode, and the rest of the sequence is taken using parameters calculated by this script. This ensures a correct sequence, regardless of changes in the scene; but has one inconvenience: some computer programs that detect sequences of AEB shots get confused, and the images do not seem to be related at all.

[**Extended AEB In BULB mode**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#extended-aeb-in-bulb-mode)

In 'M' mode with the shutter speed set to BULB, this script will fire the camera as many times as needed (in this mode, the number of shots configured is irrelevant), with shutter speeds ranging from the "Bulb min:" value to the "Bulb max:" value, separating each shot by 1EV (in this mode, the separation configured is irrelevant).

Notice also that exposure times as long as 32 minutes can be used in this mode.

[**Flash AEB**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#flash-aeb)

Similar to the [Extended AEB](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#extended-aeb) script, but only the flash exposure compensation will change.

[**Aperture AEB**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#aperture-aeb)

Similar to the [Extended AEB](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#extended-aeb) script too, and also called [depth-of-field bracketing](http://en.wikipedia.org/wiki/Bracketing#Depth-of-field_bracketing); in this case, the script changes both the aperture and shutter speed at the same time, but in different directions to maintain a constant exposure.

[**ISO AEB**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#iso-aeb)

Camera will make a photograph for each ISO active. You probably want to set the camera to M mode prior to using this script.

[**Intervalometer**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#intervalometer)

This script will fire the camera as many times as configured (or endlessly), with a configurable delay between shots; use this script to create *stop-motion* movies, for example. To configure and launch the Intervalometer, use the "Interval" sub-menu in the [scripts page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#scripts-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu):

| ***Parameter*** | ***Description*** |
| --- | --- |
| Delay | Select whether this script should start shooting immediately or wait for 2 seconds. |
| Interval | The interval time (in hours:minutes:seconds) between each shot (or group of shots); values range from 0:00:01 to 5:00:00. |
| Action | See [Script Chaining](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#script-chaining). |
| Shots | The total number of frames (shots) the script will take; values range from 1 to 9000, and also include a "No Limit" value to shoot endlessly. |
| Video format (fps) | Intended playback frame-rate, if preparing a time-lapse. |
| Recording time | Estimated time that the camera will need to record the entire time-lapse (informative only). |
| Playback time | Estimated playback time of the resulting time-lapse (informative only). |

[**Strict scheduling**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#strict-scheduling)

Notice that 400plus will always try to maintain a constant cadence of shots, independent of the exposure time: if configured to shot at 15s intervals, for example, then one shot will be taken exactly every 15s, even if the exposure is 10s. If one shot in the sequence has an exposure time longer than the configured interval time, 400plus will skip as many shots as needed and reschedule the sequence accordingly. This comment is also true when the intervalometer is configured to fire any multi-shot action.

For example, imagine an interval of 5 seconds, and exposures ranging between 1 and 4 seconds (let's suppose camera is in Av mode, and light conditions change during the script):

Time (s) : # · · · · # · · · · # · · · · # · · · ·

Exposure : \* \* \* \* \* \* \* \* \*

Notice how the length of the pause between the end of an exposure and the beginning of the next one adapts to the exposure time, so photographs always start at regular intervals. Now, imagine that one of the exposures takes longer than 5 seconds (let's say 7):

Time (s) : # · · · · # · · · · # · · · · # · · · ·

Exposure : \* \* \* \* \* \* \* \* \* \* \*

Notice that the third photograph does not take place 5 seconds after the second one, but at second 15.

***Note***: 400plus will not validate that the values introduced by the user make sense at all: it will not complain if you set an interval time of 10 seconds with and exposure time of 15 seconds, for example; it is the sole responsibility of the user to avoid these situations.

[**Time-lapse calculator**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#time-lapse-calculator)

If you plan to make a time-lapse movie with the photographs taken with this script, you can specify a desired reproduction frame-rate, and the script will calculate the resulting reproduction time. These parameters are purely informative, and have no influence on the script.

[**Bulb ramping**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#bulb-ramping)

The bulb ramping script is similar to the intervalometer, but with the added peculiarities that it is used for long exposures (1s and longer) only, and that 400plus will gradually change the exposure time and / or the duration of the interval between shots. Bulb ramping is used mostly to make time-lapses in situations when the amount of light is expected to change, such as sunsets.

| ***Parameter*** | ***Description*** |
| --- | --- |
| Delay | Select whether this script should start shooting immediately or wait for 2 seconds. |
| Shots | The total number of frames (shots) the script will take; values range from 1 to 9000, and also include a "No Limit" value to shoot endlessly. |
| Interval | The initial interval time (in hours:minutes:seconds) between each shot; values range from 0:00:01 to 5:00:00. |
| Exposure | The length (in minutes:seconds) of the first exposure; values range from 00:00:01 to 05:00:00. |
| Ramp size (time) | The length (in minutes:seconds) of the ramp; values range from 00:00:01 to 05:00:00. |
| Ramp size (shots) | The length (in number of shots) of the ramp; values range from 0 to 9000. |
| Ramping (interval) | The strength (in EV stops) of the ramp, as applied to the interval time; values range from -6 to +6. |
| Ramping (exposure) | The strength (in EV stops) of the ramp, as applied to the exposure time; values range from -6 to +6. |

Just as the intervalomenter, when the bulb ramping script is started, the camera will take a first shot (its length configured by "Exposure"), then a pause will follow (its length configured by "Interval"), and back to the beginning until the limit set by "Shots" is reached; but as the execution of the bulb ramping continues, the length of both the exposure and the pause between exposures will change smoothly, acording to the other parameters.

For example, if "Ramp size (shots)" is set to 5 shots, and "Ramping (exposure)" to +1EV, then the length of the exposure will double for every five shots taken; or, if "Ramp size (time)" is set to 1 hour, and "Ramping (exposure)" is set to -1EV, then the length of the interval between shots will half for every hour that the script has been running.

Notice that these changes happen gradually, there is never an abrupt change in exposure time or interval length. And also notice that there is one single ramp size, determined by the combination of "Ramp size (shots)" and "Ramp size (time)"; that ramp size is used to alter both the exposure time and the interval between shots, with a strength determined by their respective parameters.

***Note****:* It is quite easy to configure the script with an impossible set of parameters, or with a set of parameters that will quickly degrade to an impossible to meet schedule. If the script detects that the interval between two shot or the length of an exposure are too short, it will produce a beeping sound. If the interval or the exposure are too long, the script will stop.

[**Hand Waving**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#hand-waving)

This script will fire the camera when the display-off sensor (at the rear of the camera) is triggered. Use this script to fire the camera without the need of a remote to help reduce camera shake. If the "Repeat" option is active, this script will not end after being triggered, but will repeat itself again so you can take more shots. By default, this script will wait until something (like your hand or finger) blocks the sensor and is then removed to fire the camera. However, if the "Instant" option is enabled, the script will fire the camera as soon as the sensor becomes blocked.

To configure and launch the Hand Waving Script, use the "Handwave" sub-menu in the [scripts page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#scripts-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu):

| ***Parameter*** | ***Description*** |
| --- | --- |
| Delay | Select whether this script should take the shot immediately or wait for 2 seconds. |
| Action | See [Script Chaining](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#script-chaining). |
| Repeat | If active (set to "Yes"), the script will restart itself after is has completed. This allows you to wave your hand repeatedly to continue using the script. |
| Instant | If selected (set to "Yes"), the script will take a shot as soon as a hand is detected; otherwise, the script will wait until the hand is removed. |

[**Self Timer**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#self-timer)

This script simply adds a configurable pause before firing the camera.

| ***Parameter*** | ***Description*** |
| --- | --- |
| Delay | Time (in hours:minutes:seconds) that the script should wait before shooting; values range from 0:00:00 to 5:00:00. |
| Action | See [Script Chaining](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#script-chaining). |

[**Long Exposure**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#long-exposure)

Just that, a configurable long exposure, from 1 seconds to 5 hours.

| ***Parameter*** | ***Description*** |
| --- | --- |
| Delay | Select whether this script should take the shot immediately or wait for 2 seconds. |
| Time | The length (in minutes:seconds) of the exposure; values range from 00:00:01 to 05:00:00. |

Notice that the camera has to be in M + BULB mode to take a long exposure; this script will set the camera for you, but configuring a suitable aperture is the responsibility of the user.

[**Long Exposure Calculator**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#long-exposure-calculator)

The long exposure calculator is a tool created to help the photographer quickly determine the exposure time required by a particular scene. The idea behind the long exposure calculator is that you can quickly measure a scene using a high ISO and a large aperture, then lower the ISO value and reduce the aperture, but increase the exposure time accordingly.

For example, let's suppose we want to photograph a night scene; we decide to use the lowest possible sensitivity (ISO100), to avoid noise, and a relatively closed aperture (f/8), to get the depth of field we need. Using those parameters, the exposure time needed may easily overpass 30 seconds, and thus we cannot use the camera to make a reliable measurement.

But we can temporarily select a high sensitivity and large aperture (ISO1600 and f/2.8, for example), measure the scene, and determine we would need a 15-second exposure with those parameters. Then we enter the long exposure calculator, lower the ISO value to 100, and close the diaphragm to f/8; the Ev indicator will display a value of -9 EV, meaning that with the current parameters the exposure is 9 stops below the measured value.

We can now increase the exposition time until the Ev indicator goes back to 0, meaning the current parameters would result in the same exposure than we had at the beginning; in our case, that means raising the exposure time from 15 seconds to 32 minutes. You can also change the expected EV value, and the script will adjust the exposure time to match that EV value.

Finally, just press "Apply" to configure the camera with these parameters, and then launch the long exposure script.

***Notice***: The Ev field in this calculator cannot display values smaller than -15EV or larger than +15EV.

***Tip***: If you plan to use a ND filter, you can measure the scene without the ND; then enter the long exposure calculator and adjust the exposure to get an Ev result inverse to the value of the ND filter. For example, assuming we have an ND8 filter (8 steps of light reduction): if the camera measures 1/120s f/4.0 ISO1600 without the filter, then select 2' f/8.0 ISO100 to achieve a Ev of +8.

[**DOF Calculator**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#dof-calculator)

The DOF Calculator can help determine the depth of field of a scene, or the range of distances that will be photographed as sharp; for more information about this concept, please visit [DOF Master](http://www.dofmaster.com/index.html).

After entering the DOF Calculator, set the focal length of your lens, the aperture you are using, and the distance from the camera to the subject. The script will then display the near and far distances of acceptable sharpness. You can now change the aperture and / or the focusing distance until the depth of field displayed matches the part of your scene that you deem as important and want to remain in-focus.

When the "Max. DOF (m)" entry displays "INF!", the hyperfocal distance has been reached, and thus everything from the near distance of acceptable focus up to the infinity will be sharp.

[**Script Chaining**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#script-chaining)

Some scripts ([Intervalometer](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#intervalometer), [Hand Waving](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#hand-waving), and [Self-Timer](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#self-timer)) have an "Action" parameter, that allows the user to select another script (from ["Extended AEB"](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#extended-aeb), ["Flash AEB"](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#flash-aeb), ["Aperture AEB"](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#aperture-aeb), ["ISO AEB"](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#iso-aeb), and ["Long exposure"](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#long-exposure)) that will be used when the *parent* scripts decides to *shoot*.

This allows for the easy chaining of scripts: for example, the [Intervalometer](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#intervalometer) can be used to fire a sequence of 3 shots, using the [Extended EAEB](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#extended_aeb) script, every 5 minutes.

[**Self-Timer and Mirror Lock-Up**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#self-timer-and-mirror-lock-up)

Most scripts have a "2s delay" option; when this option is active, the script will wait 2 seconds before taking the first shot; if two scripts have been chained (see [script chaining](https://github.com/400plus/400plus/wiki/script-chaining)) only the *parent* script will wait. Notice that this pause is performed by 400plus, it is not related to the "self-timer" feature from your camera (there will be no visual or audible signaling). On the other hand, you also have the option to set the "drive mode" from your camera to "self-timer"; that option will affect each shot taken by any script, and your camera's self-timer will be used.

***Note***: Due to technical reasons, when the self-timer is active 400plus will also activate the MLU option for the duration of any script; if the self-timer is disabled, the MLU option will be disabled too.

[**Configuring Scripts**](https://github.com/400plus/400plus/wiki/User-Guide%3A-Scripts#configuring-scripts)

There are some configuration options at the "Config. Scripts" item in the [settings page](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu#settings-page) at [the menu](https://github.com/400plus/400plus/wiki/User-Guide%3A-The-Menu):

| ***Item*** | ***Description*** |
| --- | --- |
| Disable power-off | When active (set to "Yes"), the Auto power-off option of the camera is disabled; useful when using long delays in the intervalometer. |
| LCD display | Configure the brightness of the LCD display while a script is running; saves battery, and reduces glare during night shots. |
| Indicator | Configure the blinking frequency of the blue LED while a script is running. |