

## Quick Notes for Impero Versions 1.4 – 2.1

**IMPORTANT:** These notes are specific to Birger provided Imperos only, containing Birger provided firmware. They do not apply to Imperos received from View Factor Studios.

### Function Table:

<i>Button</i>	<i>Confirmation</i>	<i>Action</i>
CAL	Single Beep	Focus – Relearn lens stops (reset drift) Iris – Fully open the aperture
FN+CAL	Double Short Beep	Focus – Relearn lens stops and reset focus to zero Iris – Fully close the aperture
F	Single Beep + LED	Set Impero to control focus
F held	Ascending Tone Sequence	Set to normal focus mode
	Descending Tone Sequence	Set to alternate focus mode (sticky lenses)
I	Single Beep + LED	Set Impero to control iris
Z	Single Beep + LED	Set Impero to control zoom (not with mount)
DIR	Single Beep + LED	Change knob/lens direction between clockwise and counter-clockwise
REC	Double Beep + LED On	Record activated
	Single Beep + LED Off	Record deactivated
Auto 1	Single Beep	Recall the auto 1 position (focus/iris)
Auto 1 held	Single Long Beep	Set the auto 1 memory to the current axis and position
Auto 2	Single Beep	Recall the auto 2 position (focus/iris)
Auto 2 held	Single Long Beep	Set the auto 2 memory to the current axis and position
FN+Auto 1	Double Beep	Set the lower limit for the current axis
	Single Beep	Clear the lower limit for the current axis
FN+Auto 2	Double Beep	Set the upper limit for the current axis
	Single Beep	Clear the upper limit for the current axis
FN held	Three Tone Sequence	Enter/exit the setup menu
Limit Knob	Double Beep	Turn on knob-limit mode (2:1 knob:lens gearing)
	Single Beep	Normal mode (1:1)
Limit Lens	Double Beep	Turn on lens-limit mode (1:2 knob:lens gearing)
	Single Beep	Normal mode (1:1)
FN+Limit Knob	Double Beep	Turn on knob-limit mode (4:1 knob:lens gearing)

	Single Beep	Normal mode (1:1)
FN+Limit Lens	Double Beep	Turn on lens-limit mode (1:4 knob:lens gearing)
	Single Beep	Normal mode (1:1)
Set ADDR	Beeps + Ascending Tone	Mount's Bluetooth address learned and stored
	Beeps + Buzzer	Mount's Bluetooth address not learned
	Buzzer	Impero is not wired to the mount

## Troubleshooting:

*If you're having trouble connecting the Impero to the Birger Mount wirelessly:*

- If you have not bonded to a Birger mount, you must initiate the Bluetooth link between the Impero and the mount. This can be done in two ways:
  - a) Power up the Impero while holding down the I button until you hear a long tone. This will cause it to search for Birger mounts. It may take up to a minute for the Impero to recognize nearby Bluetooth devices.
  - b) If your Impero is running firmware version 2.0, connect the Impero to the mount using the supplied Lemo-to-Lemo cable. Press the 'Set Address' button. You will hear a series of beeps. If you hear an ascending tone sequence then the Impero has successfully learned the mount's Bluetooth address. If you hear a buzzing sound then it failed. Try again a couple more times, and if you don't succeed, try method (a).
- When powering up, make sure the Impero flashes the top LED on the I button (after the self-test), indicating that it is trying to connect to the Birger Mount you have previously bonded. If the LED does not light, press and hold the I button when powering up.
- Try bringing the mount and Impero to within a few feet of each other.
- Try changing the spatial orientation of the Impero.
- Try using fresh batteries.
- Longer antennae, such as used by 2.4GHz wireless routers, usually improve reception.

*If you're having trouble updating the Impero using the Mac application:*

- Make sure the Impero is connected to the Birger mount using the supplied Lemo-to-Lemo cable. Do not use a View Factor Lemo-to-Lemo or any other cable you are unsure of, as they are not compatible and may cause damage.
- If the Impero contains version 1.5 firmware or earlier, make sure it is in bootloader mode; to place it in bootloader mode, hold down the Auto 1 and Auto 2 buttons while turning it on. Alternatively, make sure the Birger mount is powered and one end of the Lemo-to-Lemo cable is connected to the mount. With the Impero turned off, hold down the Auto 1 and Auto 2 buttons while connecting the other end of the Lemo-to-Lemo cable to the Impero. If you are successful the Impero will have the bottom LED on the REC button lit, and nothing else.
- Make sure the app is connected wirelessly to the mount – NOT TO THE IMPERO.
- Try using fresh batteries.

*I can't update the Impero using the PC application:*

- That's right. It's not supported yet in the PC application. PC users should use the manual method.

*The Impero is behaving erratically or fails to update firmware:*

- The batteries probably need to be replaced. Do so as soon as possible, as the Impero becomes basically unusable when the batteries are low.

*The focus or iris is drifting and I'm not even touching the knob:*

- Try a fresh set of batteries. If fresh batteries do not fix the problem, then your Impero may have developed a loose encoder magnet. It needs to be returned for service.

*Focus is jumpy/ control is intermittent:*

- Try the Impero wired to the mount to make sure you're not having Bluetooth radio reception issues.
- Try a different lens, particularly the L-series Canon lenses, to verify that the lens in question is a problem. Better constructed lenses have smoother focus.
- Try the alternate focusing mode. Press the 'F' button until you hear a descending tone sequence. This indicates that you are in alternate focusing mode.

*I'm having Bluetooth reception Issues:*

- Bluetooth radios use frequency hopping so they can generally get away from noise sources, however there may be too many other Bluetooth devices in the vicinity.
- Nearby WiFi networks (802.11b/g) may also be providing too much interference for the Bluetooth radios to operate at top performance.
- Microwave ovens are notorious for polluting the 2.4Ghz band while running.

*My Impero eats batteries like Takeru Kobayashi eats Nathan's hot dogs:*

- Always replace all four batteries with fresh batteries, all of the same type, when changing batteries. Due to the Impero's design it will rapidly drain the batteries if they are mismatched.
- Upgrade to version 1.8 or later of the Impero software and try some of the new power saving modes, for example...
- If you don't need to make eyes with your Impero from across a crowded room, try dimming the LED brightness.
- If you don't need to rack focus like a drunken monkey, try running the Impero CPU at the reduced speed setting – it should still be able to keep up with you.

*My record light is off when the RED One is recording and vice-versa:*

- Your camera GPIO is not configured correctly. Set the GPIO polarity for the AUX port you are using to be 'out active hi' and 'in active lo'.

## Version Notes:

### Version 1.4

New button behaviors:

In focus mode:

Cal	: Relearn lens stops and return to focus position (reset lens drift)
FN+Cal	: Relearn lens stops and zero lens - allows you to set the lens to the zero point marked on your focus ring

In iris mode:

Cal	: Initialize and open up the aperture fully
FN+Cal	: Fully close the aperture

### Version 1.5

Speed buttons (Auto 1 and Auto 2) are now working. To set a position, press and hold the button for a few seconds until a tone is heard. Recall the position you set by a normal press of the button. Note that the speed buttons also store the axis that was being controlled at the time. After applying a speed button you will have to turn the knob slightly more than usual to see a change. This is intentional – a larger amount of hysteresis is applied to the knob so that if you accidentally brush it with your hand while applying the speed buttons, they will not get overridden by knob movement.

### Versions 1.6-1.7

Versions 1.6 and 1.7 are not usable by Birger customers – they contain code that tries to talk to View Factor motors over the CAN bus or serial port, so they will hang up or not control the Birger mount over the serial port.

### Version 1.8

This is a significant upgrade to Impero functionality. The Impero can now work wirelessly or wired to a Birger mount. There are many new features and behind-the-scenes improvements.

1) New connection behavior – the Impero will endlessly try to connect to a mount over the air or through the wired connection. You can switch back and forth between both connection types dynamically. There are still a few small issues with the Bluetooth radio which cause it to occasionally not connect or drop a connection. Sometimes the radio just crashes and there is no way to give it a hard-reset from the Impero CPU. If it hasn't (re)connected in 60 seconds, cycle the power on the Impero to try again.

You may find that connecting over Bluetooth is much more reliable if you are not using weak batteries and you bring the Impero and the mount to within a few feet of each other for the initial connection.

2) Multi-toned feedback. The user interface is now more varied.

3) Power-on self-test – a brief check of the buzzer and LED's to indicate any obvious defects.

4) Low-power modes. Through various settings, the Impero can be made more efficient in its use of battery power. You should see a significant improvement.

5) The polarity of the VA LED has been changed. When operating on battery power the LED is off, and it is on when operating on power from the wired port. Obviously this is to save power when it is most needed.

6) The SYNC LED will not stay lit when connected. This is another power saving measure. It will blink whenever the Impero is trying to establish a link (Bluetooth or serial).

7) Press and hold the CAL button in focus axis mode to learn the lens' distance stops (for i/data reporting). Some lenses have trouble with the fast method of learning distance stops. In this case, press and hold FN+CAL (you can actually release FN and continue to hold CAL) to perform the slower method of learning distance stops. An error tone will sound if the lens does not support distance stops or it fails the fast learning mode. A confirmation tone is sounded when the distance stops have been successfully learned.

8) You no longer have to place your Impero into bootloader mode while checking for updates as long as you power it up while it is connected to a powered Birger mount, and it has successfully connected in serial port mode.

9) Configuration menu. There is now a configuration menu to change various settings. To enter the configuration menu, press and hold the FN button for about five seconds. In the configuration menu the buttons on the face of the Impero control the user configurable settings. Press each button (F, I, Z, etc.) to change the settings. Press the FN button a second time to exit the configuration menu. If you do not press the FN button to exit the menu, your changes will not be saved.

## Version 2.0

1) The Impero has a new feature to help deal with lenses that have “stickiness” problems. Press and hold the 'F' button for 2.5 seconds to change the mount's focus mode. An ascending tone sequence indicates normal focusing mode. A descending tone sequence indicates the mount has been set for the new alternate focusing mode. You must have lens library version 20c for this to work.

The alternate focusing mode is to deal with lenses that have a sticking problem – often presenting as the lens lagging and then catching up with the Impero. An example lens with this problem is the EF-S 17-55mm. Note that this is a compromise that may slightly reduce the responsiveness of the focus control.

Each time a lens is put on the mount the focusing mode will default back to normal.

2) The Impero now will stay in sync with the camera's recording mode as long as the mount is connected to the Red One's AUX port and the camera's GPIO is configured correctly. To configure the GPIO for both AUX ports, use the menus on the RED camera: System -> Preferences -> GPIO. Set both Output A and Output B to 'Recording'. Also go to System -> Preferences -> GPIO-> Polarity and set these values:

GPIO IN 1 to ACTIVE\_LO  
GPIO IN 2 to ACTIVE\_LO  
GPIO OUT 1 to ACTIVE\_HI  
GPIO OUT 2 to ACTIVE\_HI

3) The 'Limit Lens' and 'Limit Knob' buttons are functional. “Limit Lens” mode means that one half turn of the Impero will map to the full focus range of the lens. “Limit Knob” mode means that two full turns of the Impero will map to the full focus range of the lens. Pressing any mode button while already in that mode will revert back to normal. Note that activating any limiting mode will cause the lens to not be in sync with marks you have put on the marking ring, unless you made those marks in the desired limited mode. These modes also work for iris control, and are remembered for each axis.

4) The 'Set Address' button can be used when wired to a Birger mount to learn that mount's Bluetooth address. If you have multiple mounts or are using your Impero for the first time, this allows you to skip the Bluetooth scan (the scan is what you invoke when you hold down 'F' or 'I' at power-up). After pressing the button you will hear several beeps. Wait until you hear a final long tone sequence or a long buzzer sound. The tone sequence indicates that the parameters were successfully learned. The buzzer indicates that an error occurred – you might want to try again.

## **Version 2.1**

1) Two more gearing modes added – 4:1 and 1:4. Accessed using FN+Limit Knob and FN+Limit Lens.

2) You can now set and clear ranges for focus and iris using FN+Auto 1 and FN+Auto 2. FN+Auto 1 sets or clears the lower limit of control and FN+Auto 2 sets or clears the upper limit of control.

## How to Set Configuration Menu Items:

There are two, three, or four possible states for each menu item. Refer to these example pictures for the states:

State 1:



State 2:



State 3:



State 4:



## Configuration Menu Settings:

### *F Button: LED Power-Save Modes*

#### Description:

Use these modes to increase the life of your batteries. Each successive state saves more power, state 4 being the most efficient.

#### States:

- 1 : LED's at 100% brightness
- 2 : LED's at 50% brightness
- 3 : LED's at 20% brightness
- 4 : LED's at 8.3% brightness (highest power savings)

### *I Button : CPU Power-Save Modes*

#### Description:

Use this setting to increase the life of your batteries. The reduced frequency mode operates the Impero CPU at half-speed. You cannot use the reduced frequency mode if you are communicating with View Factor motors over the CAN bus connection.

If you are going to use the Impero wirelessly almost exclusively then give reduced frequency mode a try. If you plan to switch between Bluetooth and wired connections on-the-fly then normal mode is needed to automatically detect the changes for a stock Birger mount at 115200 baud.

If you want the best of both worlds you can configure your Birger mount's serial port for 38400 baud, as this is the rate the Impero uses in reduced speed mode; then you can use low speed mode and still change connections on the fly. Finally, you can configure reduced speed mode and if the Impero powers up wired to a Birger mount at 115200 baud then it will stay in full speed mode until unplugged from the mount. Refer to the flowchart in *Figure 1*.

If you find that the lens is keeping up with your knob changes then you're in luck – you can get by with reduced frequency mode. It is worth a try as the power savings are good. Do not mistake lens drift for the Impero not keeping up – try both speeds to be sure.

If changed, this setting will take effect on the next power-cycle of the Impero. The Record LED will light briefly after the power-on self-test as a confirmation that the Impero is in reduced-frequency mode. The LED will light even if the Impero detects a mount on the wired port.

#### States:

- 1 : Normal
- 2 : Reduced frequency operation

### *Z Button : Audio Feedback Modes*

#### Description:

Set normal feedback or turn the buzzer off for use on a quiet set.

#### States:

- 1 : Normal
- 2 : Audio feedback disabled except for key presses and power-on test
- 3 : Audio feedback disabled except for power-on test
- 4 : Audio completely disabled

### *Dir Button : Radio Modes*

#### Description:

Set the Bluetooth connection to use a passkey or not. If you require a secure connection to your mount then use the passkey. If you are tired of entering a passkey into the connect dialog boxes on the Mac or PC when connecting to the mount, then select no passkey. Note that you must be connected to the Birger mount WIRED over the serial port when configuring this item, as the Impero configures the radio contained in the mount.

#### States:

- 1 : Bluetooth connection uses passkey
- 2 : Bluetooth connection does not use passkey

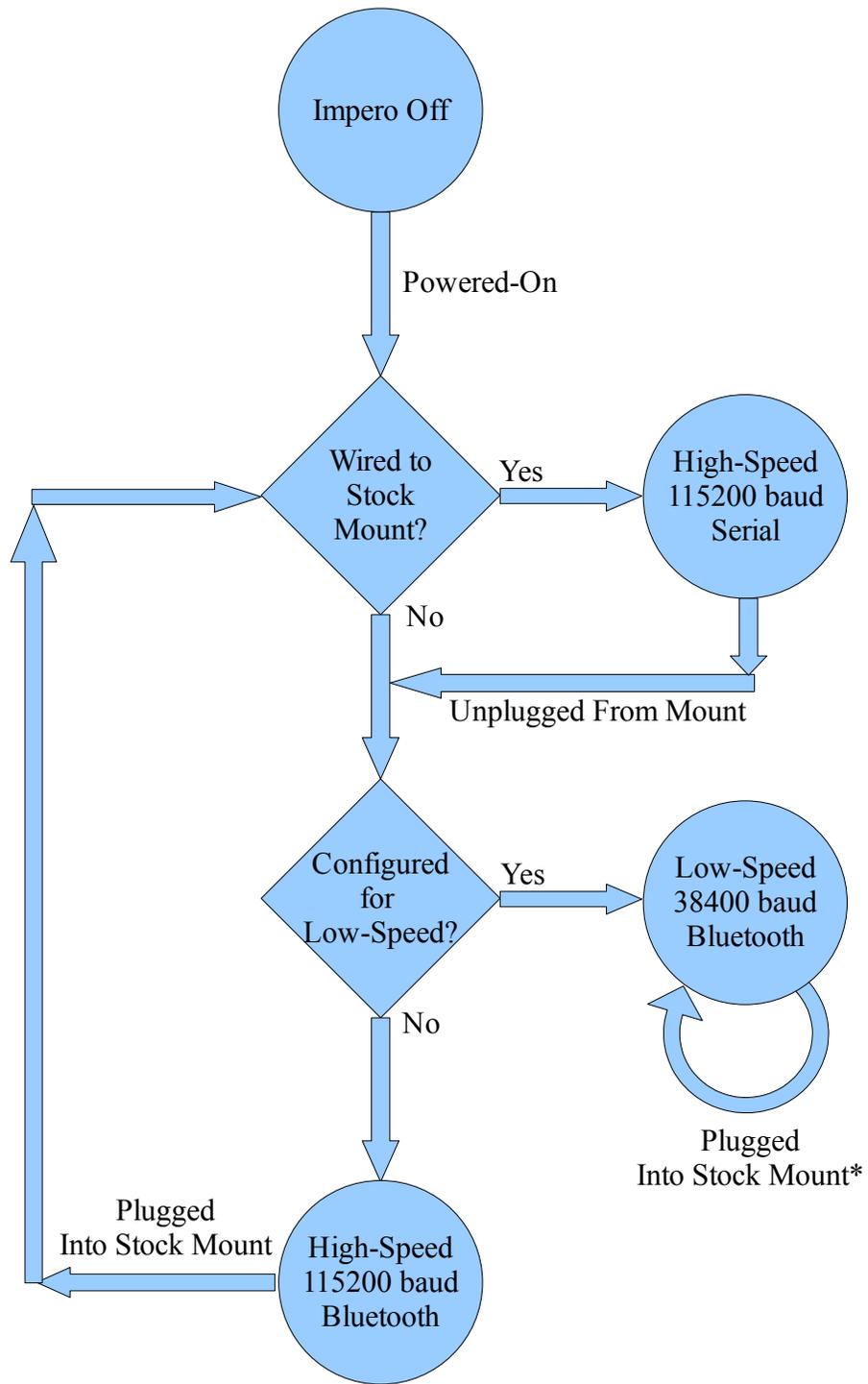
### *Rec Button : Lens/Knob Limit Behavior*

#### Description:

If you are the type that uses a monitor for focusing rather than the marking ring on the Impero, then setting this to seamless mode will allow you to alternate between Limit-Lens/Normal/Limit-Knob modes without losing the current lens focus position. In this case the lens will not stay in sync with marks on your marking ring.

#### States:

- 1 : Normal - marking ring stays true in the mode it was labeled
- 2 : Seamless - focus stays upon limit-mode changes, but marking ring is useless



\*A stock mount communicates at 115200 baud, and the Impero will not recognize it in this situation.

**Figure 1. Flowchart For Impero Interface and Speeds**