

11 Warranty

AbelCine warrants the PCU2+ to be free of defects in materials and workmanship for a period of one year from the date of purchase.

This warranty does NOT cover:

- Damage or malfunction resulting from accident, misuse, abuse or neglect
- Failure to follow the supplied instructions
- Repair or attempted repair by a third party
- Adjustment, disassembly or modification of the unit

In case of a warranty claim, contact the AbelCine service department
888.223.1599 or service@abelcine.com.

Owner's Manual

AB-PCU-300

PCU2⁺ Control Unit for Phantom



PCU2+

The PCU2+ Control Unit for Phantom Cameras and other Phantom Accessory Products are designed and manufactured by **AbelCine**.

The PCU2+ is a Non-Consumer, Industrial Product.

AbelCine

www.abelcine.com



Updates

Periodically, firmware updates are released that add features, enhance functionality, and fix bugs.

Firmware updates and revisions to this manual are available from:

<http://www.abelcine.com/r/pcu2-plus-updates>

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1 Introduction

Thank you for purchasing the PCU2+ Control Unit for Phantom Cameras.

The PCU2+ is a controller that is compatible with most Phantom high-speed cameras. In addition to controlling a Phantom without a laptop, the PCU2+ can control two Phantoms simultaneously in a stereo 3D configuration.

The PCU2+ has an integrated Bluetooth transmitter, and when paired with a Vision Research Bluetooth dongle, it can control a Phantom camera from a distance of up to 100 meters (unobstructed).

The PCU2+ can be powered by the camera and also has an internal Lithium Ion battery for wireless use.



Mounting Options

The PCU2+ provides five mounting options: two 1/4-20 holes on the top, two 1/4-20 holes on the bottom, and one V-Lock on the back.



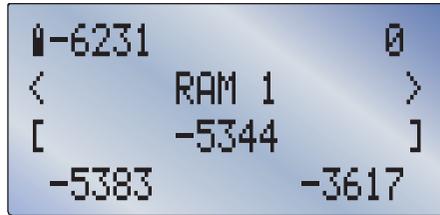
2 Basics of Operation

The PCU2+ has two main modes of operation, Record Mode and Playback Mode.

Record Mode enables you to edit the recording parameters and control the recording process. The PCU2+ starts in Record Mode.

Playback Mode allows you to control video playback and save clips to a CineMag or other media.

For more details about Playback Mode, see page 17.



Buttons

LOCK Hold PREV and NEXT to lock/unlock the PCU2+. When the PCU2+ is locked, you can monitor the camera's state but no parameters can be changed and no functions can be performed.

PREV Goes to the previous screen of parameters. In Playback Mode, skips to previous clip or to first frame of current clip.

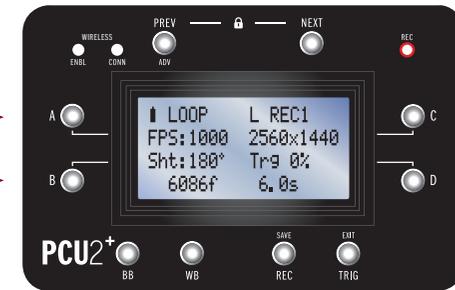
ADV In Record Mode, hold PREV to enter Advanced Menu.

NEXT Goes to the next screen of parameters. Hold to view information about the camera connected to CAM 1. In Playback Mode, skips to next clip or to last frame of current clip.

REC LED Illuminates when the camera is actively writing images to its RAM. When the PCU2+ is off, the LED indicates charging.

Soft Keys
A
B

Soft Keys
C
D



BB Performs a black balance.

WB Performs a white balance.

REC Starts recording. If there is already a clip in the camera's RAM, hold for three seconds to erase the clip and start a new recording.

SAVE In Playback Mode, saves marked portion of current clip in RAM to CineMag or other media.

TRIG Sends a trigger signal to the camera(s).

EXIT In Playback Mode, hold to return to Record Mode.

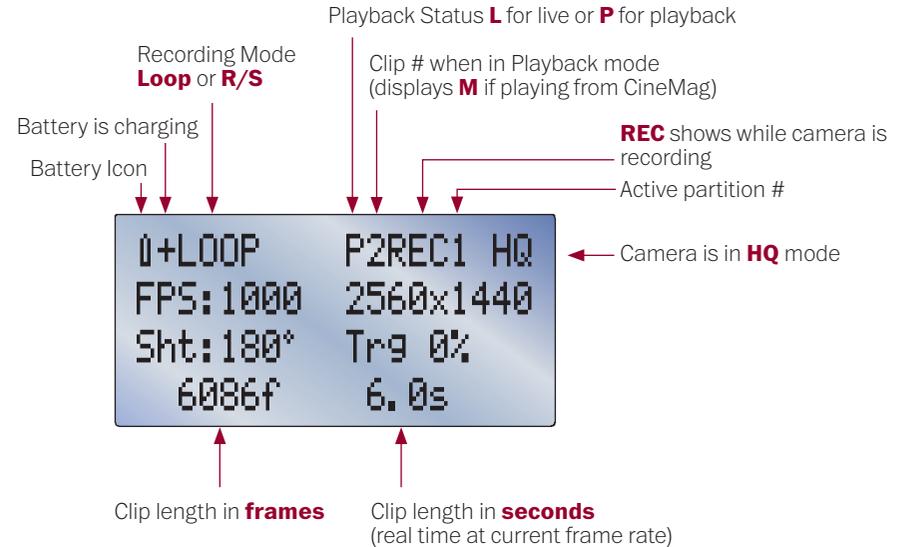
3 Record Mode

In Record Mode, the PCU2+ will show up to four parameters on the screen at once. The parameters can be accessed for editing by pressing the corresponding soft keys to the left and right of the screen.



The soft key for a parameter with a wide range of values, such as frame rate, will enter Edit Mode on a new screen (see page 12). The soft key for a parameter with very few potential values will toggle through the options.

The top line of the screen in Record Mode displays the recording mode (Loop or Run/Stop) and playback status (Live or Playback). There are also recording and HQ mode indicators.



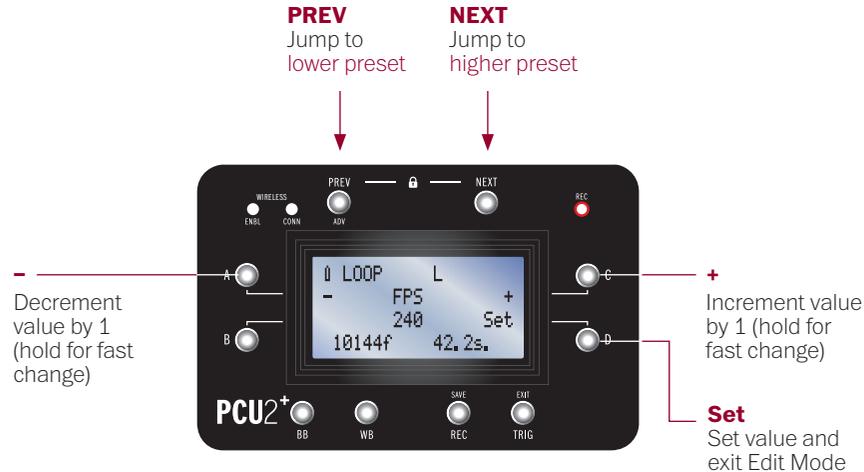
The maximum length of the current shot in frames and real time are displayed on the bottom of the screen.

3 Record Mode

Editing a Parameter

While in Record Mode, the PCU2+ can enter Edit Mode by pressing the soft keys.

Many parameters have a series of preset values that can be accessed by pressing the PREV and NEXT buttons in Edit Mode.



When the parameter is at the desired value, press **D** to set value and exit Edit Mode.

Shooting Parameters



- A - FPS:** Edit frame rate in frames per second.
- B - Sht:** Edit shutter angle.
- C - Resolution:** To select a standard resolution value, use **PREV** or **NEXT** to move the cursor over the **x** and change the paired resolution values with **A** and **C**, corresponding to **+** and **-**. To change the horizontal or vertical pixel count separately, select each with **PREV** or **NEXT** and adjust with **+** and **-**.
- D - Trg:** Edit trigger point relative to the shot length; 0% represents the tail of the shot, 100% represents the head.

Note: On cameras with a built-in capping shutter, changing FPS, shutter angle or resolution will cause the PCU2+ to trigger a black balance after a 3 second delay, unless AutoBB is disabled in the Advanced Menu (see page 22).

3 Record Mode

V16 Video Output Parameters*

```
↑ LOOP      L REC1
ISO: 1600   WB: 3200
Gam: 2.20  CC: 14
10144f     33.8s
```

- A - ISO:** Opens a sub-page (see next column) for editing all values that affect the camera's sensitivity, including Gain, Gamma, Tone Curve and Toe. The displayed number reflects the effect of all parameters.
- B - Gam:** Adjusts gamma from a range of 1.0 to 4.0. The default is 2.2. On the Flex4K Log mode can be toggled in the Gamma set screen.
- C - WB:** Adjusts white balance in degrees Kelvin. This setting affects the blue-red axis of white balance only. This value will update automatically when performing an auto white balance.
- D - CC:** Adjusts the green-magenta axis of white balance. The color compensation value will update automatically when performing an auto white balance.

V16 ISO Screen

```
↑ LOOP      L REC1
Gain:1.00   EICV:800
Gam: 2.20   TOE:1.00
10144f     33.8s
```

- A - Gain:** Adds gain to video output, increasing exposure at the cost of highlight latitude.
- B - Gam:** Adjusts gamma from a range of 1.0 to 4.0. The default is 2.2. On the Flex4K Log mode can be toggled in the Gamma set screen.
- C - EICV:** Adjusts sensitivity by applying a tone curve. This is the preferred method of setting ISO.
- D - TOE:** Changes exposure by raising the video level primarily in the shadows. 1.00 is the default and lowering this value raises the shadow levels.

Legacy Video Output Parameters

```
↑ LOOP      L
Gain:1.00   Chr: 1.00
Gam: 2.20   Hue: 0
10144f     33.8s
```

- A - Gain:** Adjust the gain of the video signal, between 1.0 and 5.0.
- B - Gam:** Adjust gamma from a range of 1.0 to 4.0. The default is 2.2.
- C - Chr:** Adjust the chroma level between 0 and 3.0.
- D - Hue:** Shift the image color towards green or magenta. The default is 0.

Note: On newer cameras the **V16 video Output Parameters** will be seen instead (see page 14).

Camera Cooling Parameters

```
↑ LOOP      L REC1
CamTemp: 40 Fan: 0
SnsTemp: 25 TE%: 5
10144f     33.8s
```

- A - CamTemp:** Camera temperature in Celsius. Press to edit target temp.
- B - SnsTemp:** Sensor temperature in Celsius. Press to edit target temp.
- C - Fan:** Displays fan speed as a percentage of total power.
- D - TE%:** Displays sensor cooler power.

* The Miro 320, V1610 and newer cameras including the Flex 4K and VEO use the V16 protocol. See page 15 for legacy camera protocol.

3 Record Mode

Video Output Toggles



- A - Zoom:** Toggle video-out zoom state.
- B - PA:** Set frame lines (production area) to a percentage of frame size or to certain fixed aspect ratios.
- C - VF/OSD:** Toggle On Screen Display for viewfinder.*
- D - SDI/OSD:** Toggle On Screen Display for SDI output.

* **Note:** For LC cameras (with a built-in LCD screen), **C** will toggle between SDI, LCD, and Off.

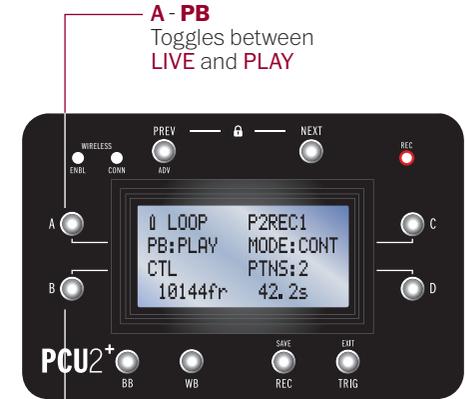
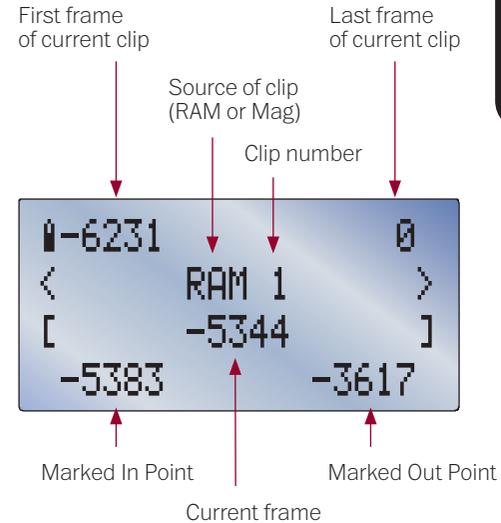
Other Parameters



- A - PB:** Toggle between Playback Mode (PLAY) and Record Mode (LIVE).
- C - Mode:** Toggle between four record modes:
 - 1 **LOOP** records continuously to RAM, replacing old frames with new ones as memory is filled. **TRIG** stops recording, based on set trigger point (see page 13 to check your setting).
 - 2 **R/S (RUN/STOP)** Records directly to a CineMag. **REC** begins recording, and **TRIG** stops recording.
 - 3 **A.PL/R (AUTO-PLAYBACK & RECORD)** Records in Loop Mode. **TRIG** automatically plays back each clip once, returns to Record Mode, and erases the clip. Applicable when using an external recorder.
 - 4 **CONT (CONTINUOUS RECORD TO MAG)** Records in Loop Mode. **TRIG** auto-saves each clip to the CineMag, automatically returns to Record Mode and erases the clip from RAM.
- D - PTNS:** Hold to partition RAM. Partitioning RAM will instantly erase any clips currently in RAM.

4 Playback Mode

To review or save footage, enter Playback Mode by toggling the 'PB' parameter (**A**) from LIVE to PLAY. If the camera is already playing back but the playback controls aren't visible on the PCU2+, press CTL (**B**).



A - PB
Toggles between LIVE and PLAY

B - CTL
Access playback controls

Once in Playback Mode, the first and last frames of the current clip are displayed on the top line. Marked frames appear on the bottom line.

4 Playback Mode

Playback Control

Clips can be played back from RAM or from a CineMag. Clips in RAM can be trimmed and saved to a CineMag.

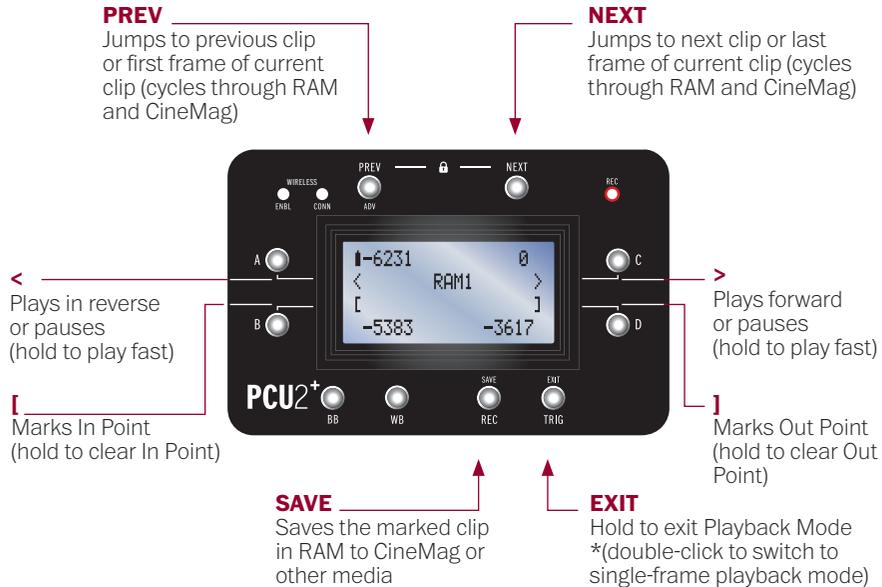
*Single-Frame Playback Mode

A = -1 (Moves video backward by one frame. Hold to play backwards at half speed.)

C = +1 (Moves video forward by one frame. Hold to play at half speed.)

Exit = Hold to exit Playback Mode. Double-click to enter/exit single-frame playback mode.

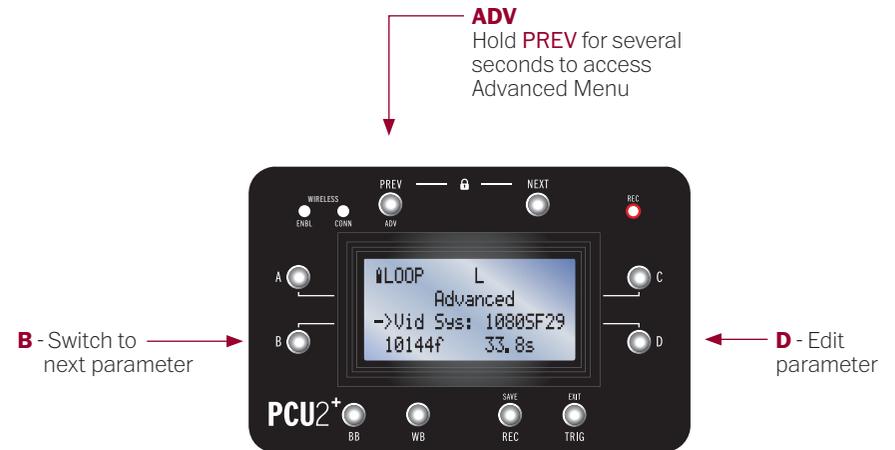
Note: With cameras set to record and play simultaneously, the playback controls will always need to be manually selected with the CTL option. Likewise, exiting the controls will not exit Playback Mode – this must be done by switching from PLAY to LIVE (see page 16).



5 Advanced Menu

Parameters that need to be changed less frequently are accessible in the Advanced Menu.

Note: Only parameters that pertain to the currently used camera model will be visible in the Advanced Menu.



5 Advanced Menu

Parameters in the Advanced Menu

Video System



Press **D** to toggle through all video output formats supported by the Phantom.

On the Flex4K **D** will open the following screen for setting video options



- **Dual** Toggles between unified output (UNI) and simultaneous Live + Playback (L/P).
- **3G** Toggles between 3G Off, 444, 60P and 4K modes.
- **Sys** Cycles through all supported video formats compatible with the current 3G mode.

Erase Mag/Storage



Hold **D** for five seconds to initiate erasure of CineMag or other media.

Playback Rate



The Phantom will normally play at the video system frame rate. Change the playback rate with **C** and **D**. This setting is persistent over power cycles.

Parameters in the Advanced Menu

Video Mode



For cameras with two SDI outputs, press **D** to toggle between video modes 4:2:2, dual-link 4:4:4, and 4:2:2 with simultaneous live and playback.

HQ Mode (for Flex 2K only)



Press **D** to toggle HQ mode.

Mag Format (for Flex4K only)



Press **D** to toggle between Raw and ProRes recording on CineMag.

FPS Presets



Toggles frame rate presets between NTSC (24/30 multiples) + PAL (25 multiples).

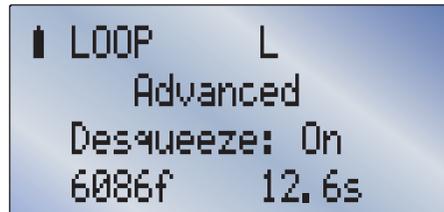
5 Advanced Menu

Auto BB (Automatic Black Balance)



Press **D** to toggle Auto BB. Only for cameras with a built-in capping shutter. PCU2+ initiates a black balance when a change in parameter requires it. This setting is persistent over power cycles.

Desqueeze



Press **D** to toggle Desqueeze. On supported cameras, this corrects the video output when the camera is used with 2:1 anamorphic lenses.

iload (reset cam)



Press **D** to load camera's factory settings.

F Stop



When a camera has a lens mount and lens that support electronic control of the f-stop (such as the Canon EF mount), the aperture can be increased or decreased by pressing **C** and **D**.

6 3D Control

When two cameras are connected, the PCU2+ always sends all commands to both cameras, enabling synchronized stereo recording and playback. There are two additional functions in the Advanced Menu for setting up and breaking down dual camera synchronization.

Setup 3D



Pressing **D** enables external frame sync on one camera, genlock on both (if available), and copies all CAM2 settings from CAM1.

Disable 3D Sync



Pressing **D** sets frame sync to internal and disables genlock on both cameras.



Note: For guaranteed matching in and out points, we recommend using a trigger hard-wired to the trigger ports of each camera. For proper sync, FSYNC must be connected between the two cameras, and a connection should be made between Timecode Out of one camera and Timecode In on the other.

7 Wireless Operation

The PCU2+ can wirelessly control a Phantom camera from a distance of up to 100 meters when used with a Vision Research Bluetooth dongle.

WIRELESS CONNECTED LED
Illuminates when there is an active connection between the PCU2+ and the Bluetooth dongle.

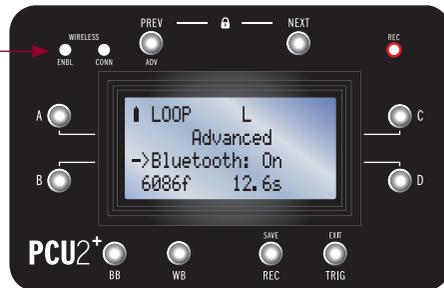
WIRELESS ENABLED LED
Illuminates when Bluetooth is enabled. When Bluetooth is enabled, wired operation is not possible.



To enable Bluetooth, go to the 'Bluetooth' page of the Advanced menu. The blue LED labeled **ENBL** will illuminate to indicate that Bluetooth is turned on.

Press **D** to toggle Bluetooth. When Bluetooth is enabled, the wired camera connection is disabled.

Make sure the antenna is screwed on and internal battery is charged. When the PCU2+ is not powered from a cable, the internal battery will provide power for up to 30 continuous hours on a full charge (see page 27).



BT: Not Paired



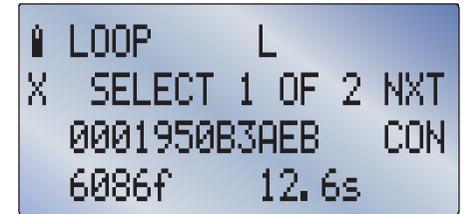
Hold **D** for 5 seconds to begin searching for cameras within range.

Note: The name shown for each camera is the MAC address printed on the side of the Bluetooth dongle. Technically the PCU2+ pairs with the dongle, not the camera.

BT: Pairing



The PCU2+ will remember the most recently paired dongle and will automatically connect when it is within range. If you need to connect to a different dongle, establish a link in the next page.

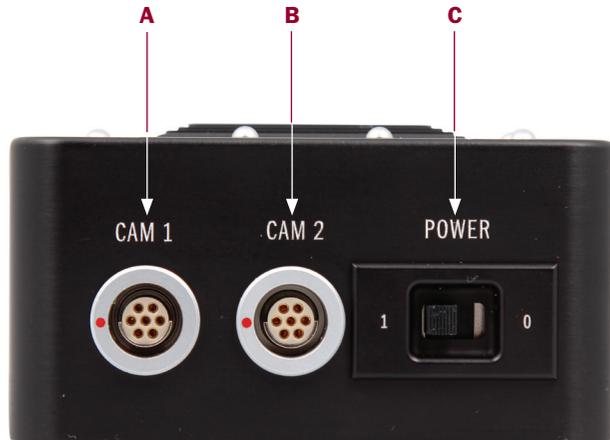


After several seconds of searching, a connection screen will appear showing the first camera is found (if any). If more than one camera is found, press **C** to see the next camera.

BT: Paired



To pair the PCU2+ with the camera shown, press **D**. To exit without pairing, press **B**.



A CAM 1

Primary camera connection. Powers the PCU2+ and simultaneously charges the internal battery.

B CAM 2

Secondary camera connection.

In 3D use, the master camera should be connected to CAM1 and the slave camera should be connected to CAM2. All commands will be sent simultaneously to both cameras.



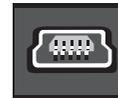
C Power Switch

Turns PCU2+ on and off. When the PCU2+ is not on a wired connection, turn the PCU2+ off whenever possible in order to conserve the battery charge.



D Battery Charger Port

This connection is for powering the PCU2+ and charging the internal Lithium Ion battery. The internal rechargeable battery allows for over 30 hours of continuous wireless operation. Use only the supplied power supply with the PCU2+.



E Update

Firmware updates can be sent through the mini-USB-compatible port. The PCU2+ can be powered through this connection as well, but the internal battery will not be charged.



F Antenna

For Bluetooth. When using a wired connection, this antenna may be removed by unscrewing it.



9 Specifications and Maintenance

Maintenance

To be notified of necessary firmware updates, please register your PCU2+ at www.abelcine.com/r/pcu2-registration.

There are no user serviceable parts in this device. Avoid moisture and exposure to extreme temperatures. To clean the enclosure, carefully spot clean with alcohol, only as necessary.

Specifications

Operating Conditions	32° - 104°F 0 - 85 % relative humidity
Weight	18.2 oz
Dimensions	5.19 x 3.1 x 1.82 inches (w/o antenna)
Bluetooth Range	100m (unobstructed)
Bluetooth Frequency	2.4 GHz
FCC ID of Radio	The FCC ID of the bluetooth module is: T9JRN41-3 The IC (Canada) ID is: 6514A-RN413

10 Warnings

When using this device, basic precautions should always be followed, including:

- 1 Read all instructions before using the PCU2+.
- 2 Use only with Vision Research cameras with a built-in Remote port, or with an adapter device or cable approved by AbelCine, Inc.
- 3 Use only with cables manufactured by or approved by AbelCine, Inc.
- 4 Do not use the PCU2+ with a damaged cable, or connected to a damaged camera.
- 5 Do not replace the internal battery. For battery replacement please contact AbelCine.
- 6 Use only the battery charger included with the PCU2+ or a replacement supplied or approved by AbelCine, Inc. to charge the internal battery.
- 7 Do not open the PCU2+. There are no user-serviceable parts inside.
- 8 To reduce the risk of electrical shock, do not use the PCU2+ when wet.

